



DEPARTMENT OF THE INTERIOR  
UNITED STATES GEOLOGICAL SURVEY

GEORGE OTIS SMITH, DIRECTOR

BULLETIN 394

PAPERS ON THE

CONSERVATION OF MINERAL  
RESOURCES  
REFERENCE

REPRINTED FROM REPORT OF THE NATIONAL CONSERVATION  
COMMISSION, FEBRUARY, 1909



WASHINGTON  
GOVERNMENT PRINTING OFFICE  
1909



# REFERENCE

## CONTENTS.

	Page.
Introduction .....	5
Coal fields of the United States, by M. R. Campbell and E. W. Parker.....	7
Estimates of future coal production, by Henry Gannett.....	27
The petroleum resources of the United States, by D. T. Day.....	30
Natural-gas resources of the United States, by D. T. Day.....	51
Peat resources of the United States, exclusive of Alaska, by C. A. Davis.....	62
Iron ores of the United States, by C. W. Hayes.....	70
Resources of the United States in gold, silver, copper, lead, and zinc, by Waldemar Lindgren.....	114
The phosphate deposits of the United States, by E. R. Van Horn.....	157
Mineral resources of Alaska, by A. H. Brooks.....	172
Index .....	209

## ILLUSTRATIONS.

	Page.
PLATE I. Distribution of coal fields in the United States.....	6
II. Distribution of petroleum and gas fields in the United States.....	30
III. Illustration of the crowding of wells, Spindletop field, Texas.....	32
IV. Production of petroleum, 1859-1907.....	38
V. Decline in production of the New York and Pennsylvania oil fields and its probable rate in the future.....	44
VI. Production of gold of the United States and of the principal States and Territories, 1885-1907.....	120
VII. Production of gold of the world and of the principal countries, 1800-1906.....	122
VIII. Production of silver of the world and of the United States, 1880-1907.....	128
IX. Production of copper in the United States, 1882-1907.....	130
X. Production of lead in the United States, 1880-1907.....	144
XI. Production of zinc in the United States, 1880-1907.....	150
XII. Map of Alaska, showing known distribution of mineral resources....	172
FIGURE 1. Curve showing production of coal, 1846-1907.....	26
2. Curve showing production of iron ore, pig iron, and steel, 1870-1900.....	110



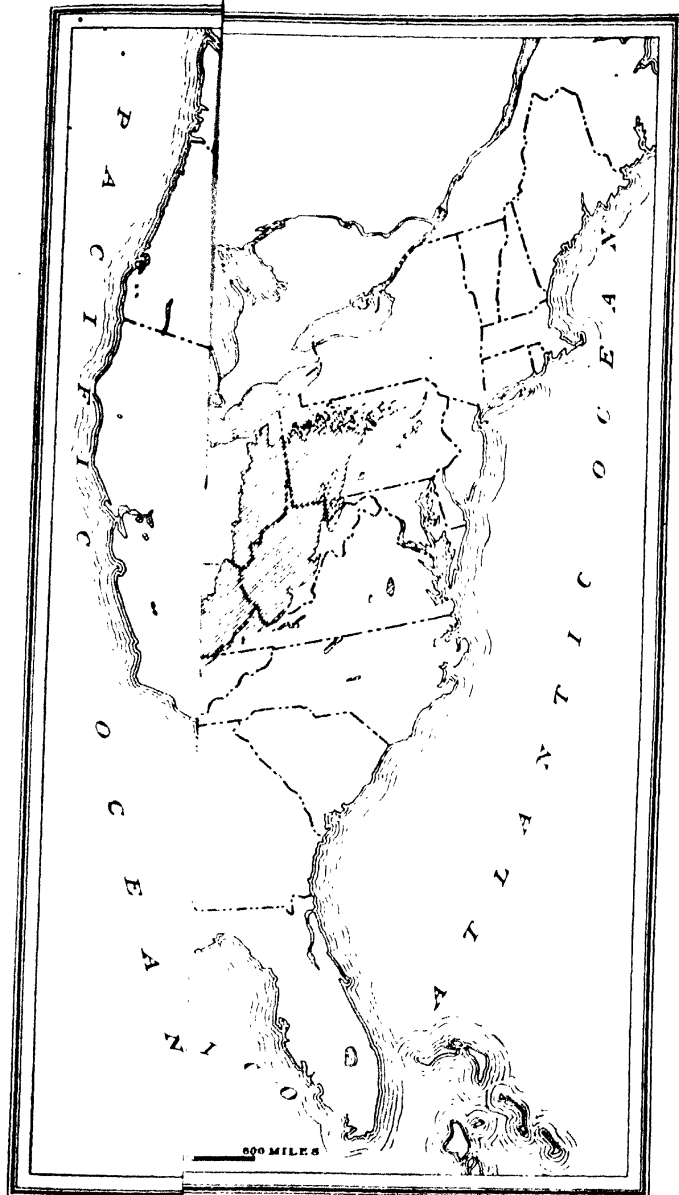


# PAPERS ON THE CONSERVATION OF MINERAL RESOURCES.

## INTRODUCTION.

This volume is a reprint of selected papers on the conservation of mineral resources, written by members of the United States Geological Survey in response to executive order, for the report of the National Conservation Commission (S. Doc. No. 676, 60th Cong., 2d sess.). Nearly all the information from which these papers are compiled had previously been collected by the Geological Survey in the performance of its regular duties. Since the organization of the Survey the mineral resources of the nation have been the principal subject of its investigations, and the data on which are based the estimates of the reserves of mineral fuels and ores are the results of nearly thirty years of official work. The report on the coal fields is practically a restatement of the information set forth on the coal-field map published in May, 1908, before the appointment of the National Conservation Commission; the other inventories constitute a summation of work in which the authors had been engaged as members of the Survey. The printing of the conservation report has furnished an opportunity to present these reprints in convenient form and, as the demand for the larger report will greatly exceed the edition authorized, this segregation of the papers relating to minerals will prove useful.







# COAL FIELDS OF THE UNITED

By MARIUS R. CAMPBELL and EDWARD W. PARKER.

## INTRODUCTION.

According to the estimates prepared by the U. S. Geological Survey, the area underlain by workable coal beds in the United States is 496,776 square miles. Of this total area, 480 square miles contain the entire anthracite coal fields of Pennsylvania. The bituminous coal fields are estimated to be contained in an area of 250,051 square miles. The grade of coal between bituminous and lignite, which is designated by the Geological Survey as "subbituminous," is estimated to be contained within areas aggregating 97,636 square miles, while the areas containing lignite aggregate 148,609 square miles. The coal fields are divided, for the sake of convenience in classification, into six main provinces, as follows (see Pl. I):

1. The eastern province, containing the anthracite coal fields of Pennsylvania and the bituminous coal fields of the Appalachian region, i. e., those of western Pennsylvania, Ohio, Virginia, West Virginia, Kentucky, Tennessee, Georgia, Alabama, and small outlying areas in North Carolina.
2. The interior province, containing the bituminous coal-producing regions of Michigan, Illinois, Indiana, western Kentucky, Iowa, Kansas, Missouri, Oklahoma, Arkansas, and Texas.
3. The Gulf province, containing the lignite areas of Alabama, Mississippi, Louisiana, Arkansas, and Texas.
4. The northern Great Plains province, containing the lignite subbituminous areas of North and South Dakota, eastern Montana, and northeastern Wyoming.
5. The Rocky Mountain province, containing the bituminous and subbituminous areas of western Montana and western Wyoming, Colorado, Utah, and New Mexico.
6. The Pacific coast province, containing the areas of Washington, Oregon, and California.

During the last few years the Survey geologists have worked in all of these coal areas and have also been making careful estimates of the quantity of coal contained in the beds when mining first began. In making these estimates care has been taken to ascertain how much of the supply is easily available and how much is either not available under present mining and market conditions or is available with

extreme difficulty. According to these estimates the quantity of coal contained within the known area of the United States when mining first began was 3,076,204,000,000 tons. Of this quantity a little less than two-thirds, or 1,922,979,000,000 tons, is considered as coal that is easily accessible or minable under present conditions, while slightly more than one-third, or 1,153,225,000,000 tons, is considered as non-minable under present conditions or accessible with extreme difficulty. It should be remembered, however, that the quantity of coal given above as easily accessible includes the lignites and subbituminous coals of the Western States, of which approximately 530,000,000,000 tons, while easily accessible, can not be considered available under present conditions or those which may be expected in the near future. This would reduce the original supply of easily accessible and available coal to approximately 1,400,000,000,000 tons.

The area of the different provinces and the quantity of coal contained therein when mining first began are shown in the following table:

*Tonnage (short tons), by provinces and accessibility*

[Original coal supply]

Province	Area in square miles	Amount easily accessible	Amount accessible with difficulty	Total
Eastern	70,022	55,634,000,000	8,000,000,000	563,634,000,000
Interior	144,664	406,667,000,000	91,000,000,000	497,667,000,000
Gulf	84,300	11,045,000,000	10,045,000,000	23,090,000,000
Northern Great Plains	103,744	521,793,000,000	49,000,000,000	980,793,000,000
Rocky Mountains	92,498	414,740,000,000	574,280,000,000	989,020,000,000
Pacific coast	1,840	11,100,000,000	10,900,000,000	22,000,000,000
Total	406,776	1,922,979,000,000	1,153,225,000,000	3,076,204,000,000

The distribution of this original supply of coal, according to grades and accessibility, is shown in the following table:

*Tonnage (short tons), by grades of coal and accessibility.*

[Original coal supply]

Kind of coal	Area in square miles	Amount easily accessible	Amount easily accessible and available	Amount accessible with difficulty
Anthracite and bituminous	250,531	1,176,727,000,000	1,176,727,000,000	505,730,000,000
Subbituminous	97,636	356,707,000,000	216,252,000,000	293,450,000,000
Lignite	148,609	380,545,000,000		354,045,000,000
Total	496,776	1,922,979,000,000	1,392,979,000,000	1,153,225,000,000

The first mining of coal in a commercial way, in the United States, was in what is known as the Richmond basin, a small area in the eastern part of Virginia. Small quantities of coal had been mined here in the latter part of the eighteenth century and it was also, in the latter part of the eighteenth and the beginning of the nineteenth

centuries that efforts were being made to introduce anthracite coal for fuel purposes. The first actual records of the production of Virginia coal were in 1822, in which year it was reported that 54,000 tons were mined. In 1820 (two years before) 365 long tons of anthracite coal, or 1 ton for each day of the year, had been shipped to distant markets. From these small beginnings of less than a century ago the production of coal has increased until in 1907 the total output of anthracite and bituminous coal approximated 500,000,000 tons. In 1837 the total production of the United States reached, for the first time, a total exceeding 1,000,000 tons, the output being reported from 4 States only—Pennsylvania, Virginia, Kentucky, and Illinois—although Maryland also was producing a small quantity of coal at that time. In 1840 the production amounted to a little over 2,000,000 tons, the output being reported from 13 States. Ten years later, in 1850, the production amounted to 7,000,000 tons; in 1860 it was over 14,000,000 tons; in 1870 over 33,000,000 tons; in 1880 over 70,000,000 tons; in 1890 it approximated 160,000,000 tons; in 1900 it was nearly 270,000,000 tons; and in 1907 it was 480,000,000 tons. The aggregate production to the close of 1907 has amounted to 6,865,097,567 short tons.

Up to the close of 1845 the total production of coal in the United States was 27,700,000 short tons, and since that time the drain on the supply has practically doubled with each decade. The total production to 1845 and decennially since that time has been as follows:

	Short tons.
Up to 1845.....	27, 677, 214
1846-1855.....	83, 417, 827
1856-1865.....	173, 795, 014
1866-1875.....	419, 425, 104
1876-1885.....	847, 760, 310
1886-1895.....	1, 586, 008, 041
1896-1905.....	2, 832, 402, 746
1906-1907.....	864, 520, 702
Total.....	6, 865, 097, 567

It is estimated that for every ton of coal mined and sold, half a ton is lost or wasted, so that the total production of 6,865,097,567 short tons to the close of 1907 represents an exhaustion of 10,200,000,000 tons, or 0.3 per cent of the total original supply, or 0.7 per cent of the coal which is easily accessible and available under the present conditions. The total supply of easily accessible and now available coal left in the ground at the close of 1907 was 1,382,780,000,000 short tons.

Accompanying this statement two charts are presented, one showing the production of coal annually from 1846 to 1907, the other illustrating the average annual production by progressive ten-year



## CONSERVATION OF MINERAL RESOURCES.

periods for the same length of time, the latter chart having been prepared in order to eliminate minor variations due to abnormal conditions. The average annual increase in coal production figured from the average of progressive decades shown on the second diagram is 7.36 per cent, and for the last five progressive decades—1894–1903 to 1898–1907—the rate of increase has been above that average.

### DURATION OF SUPPLY.

The total reserve of easily accessible and now available coal is estimated at 1,382,780,000,000 tons. The assumption that a constant output has been reached would be utterly unwarranted. On the other hand, the adoption of the flat rate of annual increase of 7.36 per cent would involve the improbable assumption that the marvelous record of the past and present will be maintained in the future and the production would continue to approximately double every decade. Using the waste allowance, on the basis of this constant rate of increase in production, the 1,382,780,000,000 tons available at the close of 1907 would be exhausted in one hundred and seven years, or by 2015 A. D. Against the use of the flat rate of increase it may well be contended that just as the rate of increase in population tends to diminish, so this rapid increase in per capita consumption of coal can not persist, and a constant annual production will be reached. However, the figures set fifty years ago by statisticians for the probable constant annual production of coal in England have already been exceeded by over 160 per cent.

Mr. Henry Gannett has made an estimate based upon a decreasing rate of increase calculated from twenty-year averages of production. The use of ten-year averages is regarded as unsatisfactory for the reason that one of the decades may consist mainly of a period of prosperity, while the preceding and succeeding decades contain periods of business depression. The twenty-year period, however, is sufficiently long to include a period of prosperity with one of business depression. Taking the four twenty-year periods since 1828, three rates of increase are obtained which show a rapid decrease. The hyperbolic curve computed from these successive rates of increase will indicate the constantly diminishing rate of increase for the successive twenty-year periods. The result obtained by this method is that the easily accessible and available coal will be exhausted about the year 2027, and all coal by the middle of that century. It is recognized that the data upon which this curve has been constructed are few and the curve correspondingly weak. However, in the above estimate all of the data have been given which it is possible to use, and this estimate is believed to represent the best use that can be made of the data at hand.

## COAL FIELDS OF THE UNITED STATES

Inasmuch as America leads the world not only in present production of coal, but also apparently possesses the greatest reserve and certainly is mining coal at much lower cost than any other country, the obvious tendency will be for European countries to look more and more to the United States for their coal supply. Therefore, while our present coal production and consumption are practically equivalent, the export of coal, unless prohibited by federal legislation, must eventually become a factor and increase the coal production in the United States beyond the demands of home consumption. On the other hand, powerful influences will come to bear upon coal production, which favor lengthening the life of the supply. Thus it is to be hoped that with more improved methods in the utilization of coal the increased efficiency per unit may act as a factor in reducing coal consumption, and improved mining methods should likewise decrease the waste percentage. The increased utilization of water power should also tend to decrease coal consumption. Again, as soon as the end appears in sight prices will rise and production diminish, and that progressively. This interference with the law of decreasing increase produced by growing scarcity will, of course, prolong the life of our coal reserves, but at the same time will greatly hamper our industries that depend on this fuel.

With so many indeterminate factors whose importance is realized but can not be measured, prophecy must possess a questionable value.

### WASTE IN COAL MINING.

The principal loss or waste attending coal-mining operations is that represented by the quantity of coal necessarily left in the ground as pillars to support the roof. In some cases it is also necessary to leave a foot or more of coal as a part of the roof, because of the unstable character of the material overlying the coal, which itself does not make a good roof. It has also been frequently the case that, where portions of the coal bed have been of inferior quality, only the high-grade coal has been mined and the poorer material left. The coal left as pillars, or as portions of the roof, may be considered a necessary loss, but that which is left because of its inferior quality can not be considered unavoidable waste in any sense, and is frequently of higher grade than coals mined and used in other portions of the country.

Enormous quantities of coal have been lost beyond recovery from the mining of beds lying below, the caving of which, upon the withdrawal of the pillars, has so broken up the overlying strata as to render it impossible to recover the coals contained therein. This has been particularly the case in some of the coal beds of western Pennsylvania, but much improvement has been observed in this regard within later years. Notwithstanding the improvement in this respect it is probable that a large amount of coal will be wasted in the West-

ern States, where a great number of coal beds are closely associated, and also where the intercalated strata are weak, forming poor roofs to the mines.

There are no exact figures as to the actual loss or waste sustained through coal left in the mines in conducting the mining operations, but it has been estimated that it amounts to 50 per cent of the quantity produced and marketed. In some cases, through careful mining and where the conditions are ideal for working, practically all of the contents of the coal beds are recovered. In other cases, particularly when the beds are of enormous thickness, the recovery has not exceeded 30 per cent of the contents. During the earlier days of mining in the anthracite regions of Pennsylvania it was estimated that only 40 per cent of the coal was marketed. This was partly due to uneconomical methods of mining, and partly to the large amount of culm, for which there was at that time no market and which was piled on the ground in unsightly mountains. At the time of the Anthracite Coal Waste Commission, which made its report in 1898, 40 per cent was still considered a maximum recovery. So far as underground workings are concerned, there has been no revolution in the methods employed since that time, but there has been a considerable improvement in the application of those methods, which has resulted in the recovery at the present time of a materially larger proportion of the coal in the ground than was the rule at that date. The earlier methods of mining consisted in leaving comparatively narrow pillars, and in the mining of large rooms the result was that the pillars were not strong enough to stand the pressure and were crushed beyond recovery. It is now customary to use larger pillars between the rooms, which makes it possible to better control the roof during "robbing" operations and to eventually recover a larger proportion of the contents of the bed.

Material improvements have also been made in the methods of the preparation of coal, so that a much greater proportion of the product hoisted is now being sent to market in merchantable condition. Part of this is due to better and more systematic methods of handling, and part to the saving of small sizes which formerly went to the culm banks. The higher prices of coal and the development of methods for using these small sizes have also made it possible, through washing processes, to rework the small coal formerly thrown on the culm banks, and these are now furnishing several millions of tons of marketable coal annually.

Under present conditions, except in cases where the surface must be maintained, it is estimated that in the Wyoming region of the Pennsylvania anthracite field the recovery for market is from 60 to 64 per cent. In the Lehigh, Mahanoy, and Schuylkill regions the recovery for shipment is estimated at 56 per cent.

When the Anthracite Coal Waste Commission\* made its report in 1893 the shipments of anthracite had amounted to 820,362,995 long tons, and the total production was estimated to have been 902,000,000 long tons. The commission estimated that for every ton produced,  $1\frac{1}{2}$  tons were lost, and the total exhaustion was estimated at 2,255,000,000 long tons. The estimated original contents of the field were 19,500,000,000 tons, and the estimated contents remaining at the beginning of 1893 were 17,245,000,000 tons.

The commission in its report (p. 149) says:

It is to be doubted whether the total coal won when the field shall be abandoned will exceed 40 per cent of the total contents. An estimate on that basis would show the available marketable coal still now in the ground to be as follows:

	Tons
Wyoming region	1,859,000,000
Lehigh region	477,500,000
Schuykill region	4,561,500,000
In all	6,898,000,000

The amount of coal won at the modern colliery due to improvements in mining methods, in the appliances for handling the coal, and in the utilization of the small sizes shows a decided advance over the earlier years of mining; a still further advance will undoubtedly be made in these directions, and the mining of the small beds, where a larger per cent can be won, will all tend to increase the total. Future estimates for a long time will in all probability show an advance in the total per cent won.

What the commission predicted in the foregoing paragraph has to some extent already been accomplished, from the fact that coal is now being mined from beds that were not considered a part of the available reserves when the commission made its report. In mining methods, as previously stated, there has also been a marked improvement, and the writers are of the opinion that it is safe to assume that since 1893 the 1 ton of coal lost for every ton mined is nearer the actual results than  $1\frac{1}{2}$  tons lost for each ton mined, and at this rate the available supply at the beginning of 1893 would have been 8,622,500,000 tons instead of 6,898,000,000 tons. The total production from 1893 to the close of 1907 has amounted to 833,187,445 long tons, which deducted from the estimated available supply of 8,622,500,000 tons would leave as the remaining available supply 7,789,312,555 long tons, it being understood that this is only one-half of the coal left in the ground untouched. What may be done in the future in the way of recovery of coal which is now considered an absolutely necessary waste and lost for all time is, of course, a matter of conjecture.

In the mining of bituminous coal it is estimated that for every ton of coal produced for market one-half of a ton is lost or wasted. The

\* The members of the commission were Eckley B. Coxe, of Driffton; Heber S. Thompson, of Pottsville; and William Griffith, of Scranton, Pa.

54,485,522 short tons, from all of which the possible by-products are apparently wasted. Assuming that the coal consumed in beehive ovens was of the same average quality as that charged into the retort ovens and that the prices would be not less than 80 per cent of those ruling in 1907, the value of recoverable products which were thus apparently wasted last year amounted to \$44,000,000, a sum equal to nearly 80 per cent of the total value of all the coal used in beehive ovens during the year. At the prices which prevailed in 1907 the value of the by-products wasted in beehive coke ovens was a little over \$55,000,000.

The value of the by-products from the retort ovens in 1907 was a little more than one-third the value of the coke produced in them.

It should be remembered, however, that beehive ovens are located in the coal-mining regions and that the cost of the coal charged into them represents only a little more than that represented by the expense of mining the coal, whereas in locating by-product recovery plants provision must be made for utilizing or marketing the by-products. It is for this reason that in much the larger number of cases the recovery plants are established near the larger cities and at considerable distances from the mining regions, and the expense of transportation is added to the mining cost of the coal. Hence it is that the value of the coal charged into by-product ovens in 1907 was \$15,871,430, or over \$2 per ton, while that of the coal used in beehive ovens was \$56,956,008, or \$1.05 per ton. It must also be remembered that the original cost of installation for a by-product plant is from four to five times that of a beehive plant of equal capacity. These disadvantages are in turn partly offset by the higher percentage yield of coke in the retort ovens and a lower delivery charge on the coke produced. In the case of beehive coke, railroad transportation expense is borne by the coke, while in retort-oven practice all, or nearly all, of the freight charge is borne by the coal.

The total value of the 5,607,899 tons of by-product coke produced in 1907 was \$21,665,157, an average of \$3.86 per ton. The value of the 35,171,665 tons of beehive coke made in 1907 was \$89,873,969, or \$2.56 per ton. If we consider that the difference in the value of the by-product coke and beehive coke was due only to the difference in freight charges, then the total value of the entire product of beehive coke made in 1907 would, if made in retort ovens close to the market, have been \$135,750,000. On adding to this the value of the by-products that should have been recovered, amounting to \$44,000,000 at 80 per cent of the market price in 1907, the total value of the coke and by-products would have amounted to nearly \$180,000,000 instead of the value of \$89,873,969 for the beehive coke alone. The value of the coal charged into these ovens, however, would have

been \$108,879,870 instead of \$56,956,008. Carrying the hypothesis further, the difference between the value of the coke and by-products if the coal had been coked in retort ovens and the value of the coke alone from the beehive ovens was, say, \$90,000,000. From this should be deducted the difference between what the value of the coal would have been at retort ovens and what it was at beehive ovens, i. e., \$52,000,000. The remainder (\$38,000,000), less the difference in operating expenses, wear and tear, interest on capital, etc., may be considered as approximately the actual net loss in value as the result of beehive coke production compared with by-product coke practice in 1907.

One of the reasons that has been given for the apparent lack of progress in retort-oven building in the last four years is the lack of profitable markets for the by-products of coal tar, and this has contributed to the backwardness of the United States in the development of the chemical industries depending upon coal tar as a raw material, and yet this country is importing coal-tar products to the value of several million dollars annually. It is also well known that the development of the coal-briquetting industry has been retarded because of the lack of assurance of a satisfactory supply of suitable coal-tar pitch for binding material, and there is also an increasing demand for creosoting oils for the preservation of timber.

#### COAL SUPPLY, PRODUCTION AND EXHAUSTION, BY STATES.

*Alabama.*—As far as known the earliest record of the existence of coal in Alabama was made in 1834. The first statement of production is contained in the United States Census Report for 1840, in which year the production is given at 946 tons. In 1907 the production was 14,250,454 tons, and the total production from 1840 to 1907 amounted to 164,734,310 short tons, which represented an exhaustion, including the waste in mining, of 247,000,000 tons. The total coal-bearing area of the State is estimated at 11,430 square miles, and the original coal supply is estimated to have been 68,903,000,000 short tons. The exhaustion to the close of 1907 represents a little over 0.3 of 1 per cent, and the production in 1907 was a little over 0.02 of 1 per cent of the estimated original supply.

*Arizona.*—A small area of 30 square miles in Arizona is estimated to contain 60,000,000 tons of coal, from which there had been no production at the close of 1907.

*Arkansas.*—As in Alabama, the first production of coal reported in Arkansas was in the census year 1840, when 220 short tons were reported as having been mined in that State. The industry in Arkansas did not develop rapidly during the early years, as the census of 1860 shows a production of only 200 tons, and that of 1880

a total of 14,778 tons. During the last twenty years, however, there has been a marked increase in the production of coal in Arkansas, and the maximum output was reached in 1907, with a total of 2,670,438 short tons. The total production to the close of 1907 amounted to 23,756,401 short tons, equivalent to an exhaustion of approximately 36,000,000 tons. The estimated original supply of coal in Arkansas was 1,887,000,000 short tons, of which the exhaustion to date represents practically 2 per cent. The production in 1907 was equivalent to 0.15 of 1 per cent of the estimated original supply. The total area in Arkansas which contains workable coal or which may contain workable coal or lignite is estimated to be 7,584 square miles.

*California.*—The coal fields of California consist of scattered areas, of which, with few exceptions, comparatively little is known. The total workable area is estimated to be 500 square miles, and the original contents of the field 1,000,000,000 short tons. Mining in California had its beginning, according to the records of the state mining bureau, in 1861. The maximum production was reached in 1880, since which time the production has been irregular and has shown a declining tendency, this being due in the last few years to the increased production of oil in the State and its use for fuel purposes. The total coal production to the close of 1907 was 5,030,945 short tons, equivalent to an exhaustion of approximately 7,000,000 tons, or 0.7 per cent of the original supply.

*Colorado.*—Colorado is one of the Western States which is rich in coal resources. The estimated total area of the coal fields is 17,130 square miles, and the original contents of these fields are estimated to have been 371,770,000,000 short tons. Coal production began in Colorado in 1864, but it was not until 1882 that the output reached as much as 1,000,000 short tons. Since that date there has been a steady increase in production, until in 1907 it amounted to 10,790,236 short tons. The aggregate production to the close of 1907 was 112,668,336 short tons, of which the equivalent exhaustion has been 169,000,000 short tons, which represents a little over 0.05 of 1 per cent of the original supply. The production in 1907 was approximately 0.004 of 1 per cent of the original contents of the fields.

*Georgia.*—The coal fields of Georgia are limited to a small area in the northwestern part of the State, estimated to cover 167 square miles and to have contained, when mining began, 933,000,000 short tons. The census report for 1860 contains the first authentic statement of production in Georgia, and the output in that year is placed at 1,900 short tons. The production of the State in 1907 was 362,401 tons, and the total production to the close of the year was 8,123,696 short tons, representing an exhaustion of 12,000,000 tons. This would still leave in the ground a total of 921,000,000 tons, of which

650,000,000 tons would probably be considered as the available supply, and this, at the rate of production in 1907, would last approximately 1,800 years.

*Idaho.*—The areas in Idaho known to contain workable coal are placed at 200 square miles, while there are 1,200 square miles which are not known, but which may also contain workable coal. The estimated original contents of the coal fields of Idaho are placed at 600,000,000 tons, from which to the close of 1907 less than 25,000 tons had been mined.

*Illinois.*—Illinois is the second State in coal-producing importance. The area in Illinois known to contain coal is larger than that of any other State east of the Mississippi River, and if we consider only the known coal areas the coal fields of Illinois cover a wider area than those of any other coal-producing State. The coal-producing area of Illinois is estimated at 35,600 square miles, and the original contents of the fields are placed at 240,000,000,000 short tons. The earliest mention of coal in the United States is contained in the journal of Father Hennepin, a French missionary, who, as early as 1679, reported a "cole mine" on the Illinois River, near the present city of Ottawa. The earliest record of actual mining is that coal was produced in Jackson County in 1810. In 1833 the production is reported to have been 6,000 short tons. In 1907 it was 51,317,116 short tons. The total production to the close of 1907 amounted to 645,868,309 tons, representing an exhaustion of 968,000,000 short tons, from which it appears that the exhaustion to the close of 1907 has been 0.4 of 1 per cent of the total estimated supply. The quantity of coal remaining in the ground at the close of 1907 was 4,661 times the production of that year, or about 2,500 times the exhaustion represented by that production.

*Indiana.*—The coal fields of Indiana lie entirely in the southwestern portion of the State. They are confined within an estimated area of 6,500 square miles, and contained, when mining first began, 44,169,000,000 tons of coal. Coal mining in Indiana began sometime between 1830 and 1840, and the census of the latter year reported a production of 9,682 tons. In 1907 the production amounted to 13,985,713 short tons, and the total production to the close of that year amounted to 159,440,390 short tons. The exhaustion to the close of 1907 had been 239,000,000 short tons, or 0.54 of 1 per cent of the original supply. Upon these estimates the quantity of coal remaining in the ground in Indiana at the close of 1907 was about 3,000 times the production of that year, and 2,000 times the exhaustion represented by that production.

*Iowa.*—The coal fields of Iowa are estimated to contain workable coal aggregating 12,560 square miles. To this may be added 5,640



square miles of possible workable coal areas. The original contents of the fields are estimated to have been 29,160,000,000 short tons. From this there has been produced from 1840, when mining first began, to the close of 1907, a total of 141,608,792 short tons, representing an exhaustion of 212,000,000 short tons. The quantity of coal still available at the close of 1907 was 28,948,000,000 short tons. At the rate of production in 1907, in estimating half a ton lost for every ton mined, this supply would last 2,550 years.

*Kansas.*—The areas in Kansas known to contain workable coal are placed at 3,100 square miles, although in addition to this there are 15,780 square miles which may contain workable coal. The estimated supply, when mining first began, is placed at 7,022,000,000 short tons. From this there has been produced from 1869 (the year of earliest production) to the close of 1907 a total of 91,176,204 short tons. This represents an exhaustion, including loss in mining, of about 136,000,000 short tons, from which it would appear that about 1.9 per cent of the original supply has been exhausted. The production in 1907 was 7,322,449 short tons, equivalent to an exhaustion of 10,000,000 short tons, which would indicate, at the rate of production in 1907, that the known coal supply of Kansas would last approximately 700 years.

*Kentucky.*—Kentucky is the only one of the coal-producing States which has within its borders areas belonging to two of the great coal fields. The eastern counties of the State are underlain by the coal beds of the great Appalachian system, while the southern limits of the central or eastern interior field are found in the more northern counties of the western part of the State. The eastern areas contain 10,270 square miles, the contents of which, when mining began, are estimated at 67,787,000,000 short tons. The western areas contain 6,400 square miles, the original contents of which are placed at 36,240,000,000 short tons. The total estimated original supply of the State was therefore 104,027,000,000 short tons. Mining began early in the second quarter of the nineteenth century, and it is estimated that from 1829 to 1835 the production ranged from 2,000 to 6,000 tons a year. The production in 1907 was 10,753,124 short tons, and the total production to the close of the year was 122,404,574 short tons, which represents an exhaustion of 184,000,000 short tons, or 0.18 of 1 per cent of the original supply. The quantity of coal left in the ground at the close of 1907 would then be 103,844,000,000 tons, of which approximately 67,000,000,000 short tons would be considered available, or, in other words, the supply at the close of 1907 was 6,700 times the production in that year.

*Maryland.*—The coal fields of Maryland are confined to a limited area in Allegany and Garrett counties in the western part of the State. This area has an extent of 455 square miles and the original

supply is estimated to have been 8,044,000,000 short tons. Mining began early in the nineteenth century, and shipments were made down the Potomac River in 1830. The first shipments by railroad were made in 1842, in which year 1,708 tons were shipped over the newly built Baltimore and Ohio Railroad. In 1907 the production amounted to 5,532,628 short tons, and the total production to the close of that year aggregated 147,606,548 short tons, equivalent to an exhaustion, including waste, of 221,000,000 tons, or not quite 3 per cent of the original supply. The supply still remaining at the close of 1907 was 7,823,000,000 short tons, 1.422 times the production and 948 times the exhaustion represented by the production of that year.

*Michigan.*—The coal fields of Michigan are the only ones within the drainage basin of the Great Lakes. They occupy an area of approximately 11,000 square miles and are estimated to have contained when mining first began a total of 12,000,000,000 short tons of coal. Although coal mining has been carried on in Michigan for about seventy years, it is only a little more than a decade since it became of any importance as an industry, the production exceeding a million tons a year for the first time in 1901. The total production to the close of 1907 was 13,842,943 short tons, which, including waste, represents an exhaustion of 21,000,000 short tons, or 0.175 of 1 per cent of the total original supply. The production of Michigan in 1907 was 2,035,858 short tons. The supply remaining at the close of that year was, according to the best estimates, 11,979,000,000 short tons, of which 7,986,000,000 tons would be considered as available. This is equivalent to 3,900 times the production of 1907.

*Missouri.*—The original coal supply of Missouri is estimated to have been 40,000,000,000 short tons, included within an area of 23,000 square miles. The production of the State to the close of 1907 had amounted to 97,618,106 short tons, representing an exhaustion of approximately 146,000,000 tons, or 0.36 of 1 per cent of the original supply. The production in 1907 was 3,997,936 short tons, which is equivalent to an exhaustion of approximately 6,000,000 tons. The supply remaining at the close of 1907 is about 6,500 times the exhaustion created by the production in that year.

*Montana.*—Montana's scattered coal fields, known to contain workable coals, aggregate 34,067 square miles, while the areas which may contain workable coal, but which are not well known, amount to 17,575 square miles. The original contents of these coal fields are estimated to have been 303,060,000,000 short tons, from which there have been mined to the close of 1907 approximately 24,740,000 tons, representing an exhaustion of 37,000,000 tons, or 0.012 of 1 per cent of the original supply. The production in 1907 of a little over

2,000,000 tons is equivalent to an exhaustion of about 3,000,000 tons, and the coal left in the ground was 100,000 times that exhausted.

*New Mexico.*—The coal fields of New Mexico aggregate a total area of 18,335 square miles, and the original supply is estimated to have been 163,780,000,000 short tons, from which there had been produced to the close of 1907 a total of 22,325,432 short tons, representing an exhaustion of 33,000,000 tons, or 0.02 of 1 per cent of the original supply. The production in 1907 (2,628,959 short tons) is equal to nearly 12 per cent of the entire production of the coal to the close of that year, while the coal left in the ground is nearly 65,000 times the production in 1907, and over 40,000 times the exhaustion represented by that production.

*North Carolina.*—Two small areas of Triassic age contain all the coal known to exist in North Carolina. The total area is about 60 square miles, and the original contents of the field are estimated at 200,000,000 short tons. These areas have never been worked to any large extent, and the total production to the close of 1907 was less than half a million tons.

*North Dakota.*—Although the coal fields of North Dakota are of wide extent, the coal itself is all of lignitic character and of little commercial value at the present time. The total areas supposed to contain workable lignite are placed at 35,500 square miles and the original contents have been estimated at 500,000,000,000 short tons. The production, particularly considering the large supply, has been very small, the total exhaustion to the close of 1907 having amounted to only 4,000,000 tons.

*Ohio.* Compared with the supply of coal originally contained within the coal fields of Ohio, the rate of exhaustion has been greater than that of any other State in the Appalachian system, with the exception of Maryland. The estimated original supply contained within an area of 12,660 square miles was 86,028,000,000 short tons. The first record we have of the production in the State is in the year 1838, when 119,952 short tons of coal were mined. Ohio's output was at that time exceeded only by the production of Pennsylvania anthracite and bituminous coal from the Richmond basin. From 1845 to 1876 Ohio ranked second among the coal-producing States. In 1876 it was surpassed by Illinois, and since 1896, when it was surpassed by West Virginia, it has ranked fourth among the coal-producing States. In 1907 Ohio contributed 32,142,419 short tons of coal to the total product of that year. The total output of Ohio mines from 1838 to the close of 1907, a period of seventy years, has amounted to 492,769,358 short tons, representing an exhaustion of 739,000,000 tons, or something less than 0.9 of 1 per cent of the estimated original supply. The production of 1907, which was a little less than 7 per cent of the production to the close of that year, was equivalent to an exhaustion

of about 48,000,000 tons. Deducting from the original supply the exhaustion at the close of 1907, there would still be available on January 1, 1908, 85,980,000,000 tons, or nearly 2,000 times the production in 1907.

*Oklahoma.*—All of the coal in Oklahoma is contained in that portion of the State which was formerly known as the Creek, Cherokee, and Choctaw nations of Indian Territory. The total area underlain by workable coal is estimated to be about 10,000 square miles, and the original contents are estimated to have been 79,278,000,000 tons. Mining did not begin in Indian Territory until comparatively late, the first production reported having been in 1880, when 120,947 short tons were produced. The industry has progressed rapidly, however, and the production in 1907 amounted to 3,642,658 short tons. The total production to the close of 1907 was 39,845,015 short tons, representing an exhaustion of approximately 60,000,000 tons. The quantity of coal left in the ground in Oklahoma at the close of 1907 was 13,000 times the exhaustion represented by the production in that year.

*Oregon.*—As far as known the earliest record of coal production in Oregon was in 1880, when the output amounted to 43,205 short tons. In 1907 Oregon's production was 70,981 short tons, and the aggregate production from 1880 to the close of 1907 was 1,790,392 tons, which represents an exhaustion of 2,700,000 tons. The total area in the State containing workable coals is estimated at 230 square miles and the original supply at 1,000,000,000 short tons.

*Pennsylvania.*—The supplies of anthracite coal in Pennsylvania are discussed elsewhere in this paper. (See p. 13.) The bituminous areas in the western portion of the State are estimated to have an extent of 14,200 square miles and to have contained, when mining first began, 112,574,000,000 short tons. The development of the Pennsylvania bituminous coal fields did not begin until about twenty years after anthracite mining was established as an industry, the first production having been reported in the census year 1840, when 464,826 short tons were mined. Up to 1897 the production of anthracite coal in Pennsylvania exceeded that of bituminous, but in 1898 the bituminous production took the lead and has continued to lead since that date. In 1907 the production of bituminous coal exceeded that of anthracite by nearly 80 per cent, and as indicative of the extent to which the bituminous coal-mining industry of Pennsylvania has grown it may be stated that the production in 1907 was nearly three times that of 1897, only ten years before. The total production of bituminous coal in Pennsylvania to the close of 1907 was 1,846,069,253 short tons, which was equivalent to an exhaustion of 2,760,000,000 tons, or 2.5 per cent of the original supply. The

exhaustion represented by the production in 1907 was 225,000,000 tons. The supply remaining at the close of 1907 was 109,804,000,000 tons, or 492 times the exhaustion represented by the production of that year.

*South Dakota.*—The northwest corner of South Dakota contains the southern extension of the North Dakota lignite beds, and it is estimated that about 6,000 square miles of this territory may contain workable lignites. The contents are estimated at 10,000,000,000 short tons, and these are practically untouched.

*Tennessee.*—The coal fields of Tennessee are contained in a narrow strip in the eastern counties of the State, where the Appalachian province crosses the State in a northeast-southwest direction. Mining began sometime between 1830 and 1840, and the census for the latter year reported a production of 558 tons. Coal mining did not, however, develop into an important industry in Tennessee until after the close of the civil war, and it was not until 1883 that the production reached as much as 1,000,000 tons annually. Since that time it has increased with notable regularity, until in 1907 the production amounted to 6,810,243 short tons. The total area of bituminous coal in the State is estimated at 4,400 square miles, and the total original supply at 25,665,000,000 tons. The total production to the close of 1907 amounted to 84,304,601 short tons, representing an exhaustion of approximately 126,000,000 tons, or about 0.5 of 1 per cent of the original supply. The exhaustion represented by the production in 1907 was approximately 10,200,000 tons, and the supply left in the ground at the close of the year was equal to 2,500 times this exhaustion.

*Texas.* The known bituminous coal fields of Texas are estimated to contain 8,200 square miles, and the exploited lignite fields 2,000 square miles. In addition to this there are 5,300 square miles which may contain workable bituminous coal and 53,000 square miles which may contain workable lignite. The estimated contents of the bituminous coal fields when mining first began in Texas were 8,000,000,000 short tons, and of the lignite fields 23,000,000,000 short tons. The exploitation of both the lignite and the bituminous areas is of comparatively recent date, no production having been reported from Texas prior to 1884, and it was not until 1901 that the output reached as much as 1,000,000 tons. The production to the close of 1907 was 14,444,948 short tons, representing an exhaustion of 22,000,000 tons, or 0.07 of 1 per cent of the original supply.

*Utah.*—Utah's coal fields are contained in scattered areas aggregating 15,130 square miles. The quality of the coals ranges from sub-bituminous to anthracite. The estimated original supply was 196,458,000,000 short tons, from which the exhaustion, including waste, at the close of 1907, was 28,000,000 short tons, indicating that

there were still remaining in the ground 196,430,000,000 tons, or a little more than 100,000 times the production of 1907.

*Virginia.*—The Richmond basin in Virginia, where coal mining in the United States was first carried on, contains 150 square miles. Another small area in Montgomery County contains 200 square miles of coal-productive territory, but the principal regions are in the southwestern corner of the State, which is crossed by the Appalachian system. The portion of the Appalachian coal field in Virginia is estimated to be 1,550 square miles. The original supply has been placed at 22,500,000,000 short tons. From this there had been produced at the close of 1907 a total of 57,229,152 short tons, representing an exhaustion of 86,000,000 tons. The production in 1907 was 4,710,895 short tons, equivalent to an exhaustion of a little over 7,000,000 tons, so that the coal left in the ground in Virginia at the close of 1907 was 2,000 times the exhaustion represented by the production of that year.

*Washington.*—Washington's coal supply is contained within a number of areas that are scattered over the State and aggregate approximately 1,100 square miles. The estimated original supply was 20,000,000,000 short tons, and while mining began there as early as 1860, the total production to the close of 1907 was only 43,108,697 short tons, of which nearly 50 per cent was produced within the last seven years. The exhaustion represented by the production to the close of 1907 was 61,000,000 short tons, which is equivalent to about one-third of 1 per cent of the original supply. The quantity of coal still in the ground at the close of 1907 was estimated to be 19,936,000,000 short tons, equivalent to 5,400 times the production of 1907 and 3,600 times the exhaustion made by that output.

*West Virginia.*—The total area containing workable coal in Virginia is 17,000 square miles, and the original supply when mining first began was 231,039,000,000 tons. West Virginia was not admitted as a State until 1863, in which year the production amounted to 441,648 short tons. The quantity of coal mined prior to that time, in the portion of Virginia which afterwards became West Virginia, was not sufficient to materially affect the total output. For a number of years West Virginia has been third among the coal-producing States, and in 1907 the production amounted to a little over 18,000,000 tons. The aggregate production to the close of 1907 was 434,198,539 short tons, equivalent to an exhaustion of 650,000,000 tons. At the beginning of 1908 there still remained available in the coal fields of West Virginia 230,389,000,000 short tons, nearly 4,800 times the production in 1907, or 3,200 times the exhaustion represented by the 1907 output.

*Wyoming.*—The estimated original coal supply of Wyoming is larger than that credited to any other coal-producing State, with the exception of North Dakota. In the latter State, however, the entire

supply is lignite, while in Wyoming the coals are of subbituminous or of bituminous character. The total area which may contain workable coals has been estimated at 50,793 square miles, and the contents of this field, when mining first began, at 424,085,000,000 short

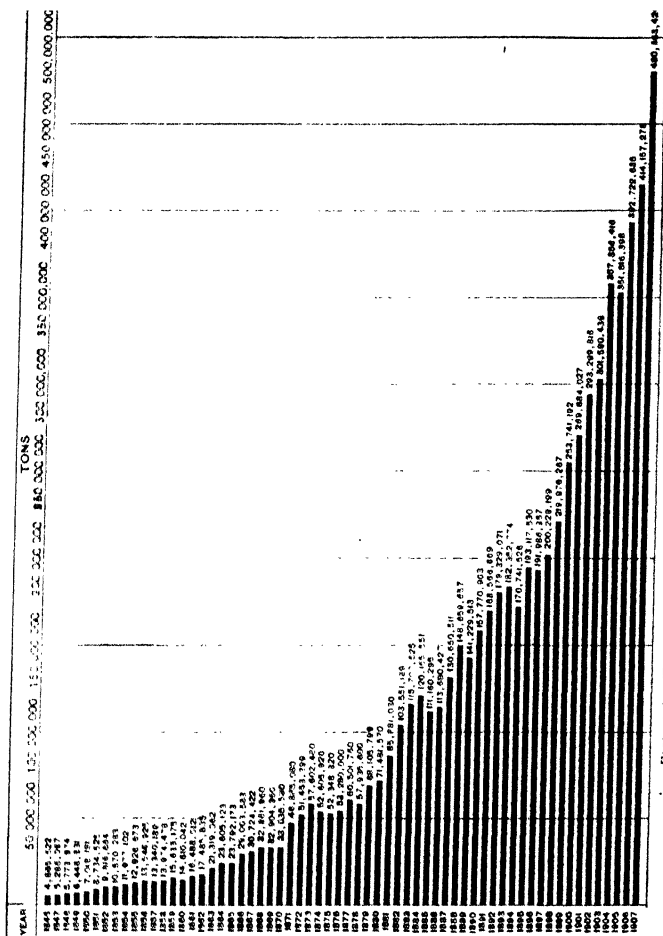


FIGURE 1.—Chart showing production of coal in the United States from 1846 to 1907.

tons. In comparison the aggregate production at the close of 1907, which was 77,818,765 short tons, appears insignificant. The total exhaustion of the beds to the close of 1907 amounted to 116,000,000 short tons, or 0.027 of 1 per cent of the total estimated supply.

## ESTIMATES OF FUTURE COAL PRODUCTION.

By HENRY GANNETT.

The Geological Survey estimates the amount of coal remaining in the ground to be 3,117,043,000,000 tons, of which about two-thirds is easily obtainable, the other third being of indifferent or poor quality and difficult of mining.

In nearly a century of mining about one-third of 1 per cent of the supply has been taken out of the ground. The production during the year 1907, which was more than 180,000,000 tons, was much larger than in any previous year.

The Geological Survey also estimates that in mining practice about 1 ton of coal is lost for every 2 tons won, either by leaving it in the ground or in breaking and transporting.

In order to reach even an approximate idea of the length of time that this coal supply will last, it is necessary in the first place to estimate the probable annual production in the future. That it will increase beyond the present maximum goes without saying, but at what rates and for how long a period will the increase continue are questions whose solution can only be guessed. Unfortunately we have very few data upon which to build. The rate of yearly increase of production is very irregular, so irregular that no conclusions can be drawn from it. It is impossible to construct from it a smooth curve which might be projected into the future. Even if ten-year averages be taken, and the rate of progress be thus obtained per decade, the result is very unsatisfactory, for the reason that one of the decades may consist mainly of a period of prosperity while the preceding and succeeding decades may contain periods of business depression. It is necessary, therefore, in order to obtain rates of increase which are fairly comparable with one another that we take the rate of production for periods sufficiently long to include a period of prosperity with one of business depression, i. e., twenty years. This has been done with the following results, expressed in terms of millions of



tons, each the production of twenty years, with percentages of increase:

*Production of coal and rate of increase, by twenty-year periods, 1828 to 1907.*

Years.	Produc- tion.	Per cent of Increase.
	Millions of tons.	
1828-1847. . . . .	37.3	
1848-1867. . . . .	396.0	720
1868-1887. . . . .	1,451.0	374
1888-1907. . . . .	5,068.0	249

We have here three rates of increase and they show a very rapid decrease. It would, of course, be folly to assume that the latest rate of increase, 249 per cent, is to continue indefinitely or even at all. There is every indication that the next twenty years will show a great diminution: indeed, at the present rate of increase of production, all the coal would be exhausted before the end of the present century.

The normal curve formed by rates of increase is a hyperbola—that is, if population or production, etc., is not interfered with by extraneous influences, it tends to increase in a constantly diminishing ratio, but never ceases to increase, and the successive rates of increase when plotted to scale form a hyperbolic curve. The equation of this curve, referred to its asymptotes, is  $(x - a)(y - b) = c$ . We have three points on this curve, i. e.:

$$\begin{array}{ll} x = 1 & y = 720 \\ x = 2 & y = 374 \\ x = 3 & y = 249 \end{array}$$

$x$  being periods of time, in this case twenty-year intervals, and  $y$  being the corresponding per cents of increase.

Using these values in the above equation, we obtain for the constants:

$$\begin{array}{l} a = 13 \\ b = 17 \\ c = 833 \end{array}$$

Substituting these values of the constants in the equation, and giving  $x$  successively values of 4, 5, 6, etc., the following values for  $y$ , the per cents of increase, are obtained, as shown below, with the resulting amount of coal production in each successive twenty-year period:

*Estimated production of coal and rate of increase, by twenty-year periods, 1908-2067.*

Years.	Per cent of increase.	Production. Millions of tons.
1908-1927.....	183	21,375
1928-1947.....	145	52,309
1948-1967.....	119	114,688
1968-1987.....	100	229,376
1988-2007.....	85	424,346
2008-2027.....	74	738,362
2028-2047.....	65	1,218,297
2048-2067.....	58	1,924,909

The production for the double decade 2048-2067 is estimated at the enormous rate of 274 tons (including waste) for every man, woman, and child then in the country, or, excluding waste, 183 tons per capita.

As is seen above, the easily accessible coal may be exhausted about the year 2040, and all coal about the middle of that century; i. e., ten years later.

It must not be supposed, however, that this programme will be carried out. In the first place, the data upon which this curve has been constructed are very few, and the curve is correspondingly weak. They are, however, all that we possess and the foregoing is probably the best way to use them.

In the future, powerful extraneous influences will come to bear on coal production, and all, as far as can be foreseen, except possible exports, are in favor of lengthening the life of the supply.

As soon as the end appears in sight the price will rise and production diminish, and that progressively. This interference with the law of decreasing increase, produced by growing scarcity, will of course prolong the life of our coal reserves, but at the same time will greatly hamper our industries dependent on this fuel.

Again, the development of water power will prove another disturbing factor which will prolong the life of our coal supply. To a great extent, city heating and lighting and power for manufacturing, and transportation will in the near future be furnished by water power. It is estimated that in round numbers 30,000,000 horsepower are going to waste in our streams to-day, most of which can and will be utilized, replacing coal. If all the latent water power in the country were harnessed within the next twenty years, it would probably prolong the life of the coal supply by about eighty years.

Furthermore, the economies to be introduced in mining and handling coal will result in saving a large part of the present waste. If the production and transportation were relieved of all waste within the next twenty years, the coal supply would last twenty years longer.

# THE PETROLEUM RESOURCES OF THE UNITED STATES.

By DAVID T. DAY.

## EXTENT OF THE PETROLEUM FIELDS.

This report deals with the petroleum fields of the United States as known at present; that is, it is limited to the petroleum pools actually developed, or what is known as "proved territory."

## LOCATION.

The areas where petroleum is known to occur at present are shown on Plate II.

*Appalachian.*—Petroleum is unknown and improbable east of the Allegheny Mountains. Parallel with their western flank the Appalachian belt extends from western New York to Tennessee. It crosses western Pennsylvania, and there petroleum was first found in large quantity. The supply in Pennsylvania is rapidly becoming exhausted. It has declined to one-third of its highest rate of production. This high-production mark was only seventeen years ago. The Appalachian field continues across West Virginia and includes the eastern edge of Ohio. Farther south moderate supplies have long been known, and they are still being developed in Kentucky and Tennessee.

"Petroleum" in this report means crude petroleum, as it comes from the earth; that is, before it has been refined. The word "oil" refers to products obtained from petroleum.

The petroleum of this field (known generally as Pennsylvania petroleum) differs essentially from that of the other fields in the United States. It is notably different from any other petroleum thus far found in the world. It is most easily converted into lamp oil, and yields the greatest percentage of this product. The lamp oil is, in fact, the finest yet produced—much better than any other except the products from western Ohio and Indiana, and the petroleum from this latter field costs more to refine.

Farther south, in Kentucky and Tennessee, the product is progressively poorer, but is much better than Russian or any other of the foreign products with which it comes in competition.



PLATE 114 - ART II

I am tempted here to give one of his letters to Thorneycroft belonging to the present year (1860); as conveying his first impressions of the working of the change in the Government of India. He repeatedly adverted to the subject in the correspondence of the next few years; and his letters will be of use in comparing his prophecies with the actual events.

"Your letter of September 19 gave me much pleasure because it contained better and more encouraging accounts of your health, and also because it said that things were likely to be made pleasanter to you at the India House by change in the mode of transacting business. I shall be greatly interested by hearing more of these changes, since, as you are aware, I think that the practical goodness of a government depends, much more than is generally supposed, on the mode of business. It is a comfort to hear of any changes for the better. Unfortunately, the deteriorations in the structure of the instrument of Government in detail, which I have feared would follow from the substitution of the traditions of the Government Offices for those of the India House, seem to be taking place still more rapidly than I have feared. If the Council at Calcutta is to be abolished, and a Cabinet of Secretaries put in its place, as the newspaper says, and as is too probable, the change will be almost fatal: for the Members of Council are the only high administrative Officers not dependent on the will of the Governor-General, and the Minutes are the only Channel through which an independent and ungarbled opinion necessarily reaches the home authorities. The difficulties of governing India have so much increased while there is less and less wisdom employed in doing it, that I begin to despair of the whole subject, and almost believe that we are at the beginning of the end."

It was in 1860, that he wrote his volume on *Representation of Government*. The state of the Reform question, which led to the establishment of the Reform Association, was the motive of the

larger undertaking, his principal contribution to a Philosophy of Politics. He says in the Preface, that the chief novelty of the volume is the bringing together, in a connected form, the various political doctrines that he had at various times given expression to : but the mere fact of viewing them in connexion necessarily improved their statement and bearings ; and the six or eight months' additional elaboration in his fertile brain could not but infuse freshness into the subject.

In my estimate of Mill's genius, he was first of all a Logician, and next a social philosopher or Politician. The *Political Economy* and the *Representative Government* constitute his political outcome. People will differ as to his conclusions, but certainly whoever wishes to judge of any matter within the scope of the *Representative Government* should first see what is there said upon it ; and the work must long enter into the education of the higher class of politicians. The chapter on the "Criterion of a good form of Government" contains an exceedingly pertinent discussion of the relation between Order and Progress ; and demonstrates that Order cannot be permanent without Progress ; a position in advance of Comte. The third chapter demolishes the fond theory entertained by many in the present day that the best government is "Absolute authority in good hands". Then comes a question that needs all the author's delicacy, tact, and resource—Under what conditions is representative government applicable ? But his strongest point throughout is the exposition of the dangers and difficulties attending on Democracy. This was one of his oldest themes in the *Westminster Review* ; he has put it in every possible light, and discussed with apostolic ardour all the contrivances for withstanding the tyranny of the majority. He took up with avidity Mr. Hare's scheme of Representation, and never ceased to urge it as the greatest known improvement that representative institutions are susceptible of. He dismisses Second Chambers as wholly inadequate to the purpose in view, however useful otherwise. The discussions

I am tempted here to give one of his letters to Thornton, belonging to the present year (1860); as conveying his first impressions of the working of the change in the Government of India. He repeatedly adverted to the subject in the correspondence of the next few years; and his letters will be afterwards of use in comparing his prophecies with the actual events.

"Your letter of September 19 gave me much pleasure, because it contained better and more encouraging accounts of your health, and also because it said that things were likely to be made pleasanter to you at the India House by changes in the mode of transacting business. I shall be greatly interested by hearing more of these changes, since, as you are aware, I think that the practical goodness of a government depends, much more than is generally supposed, on the forms of business. It is a comfort to hear of any changes for the better. Unfortunately, the deteriorations in the structure of the instrument of Government in detail, which I always feared would follow from the substitution of the traditions of the Government Offices for those of the India House, seem to be taking place still more rapidly than I looked for. If the Council at Calcutta is to be abolished, and a Cabinet of Secretaries put in its place, as the newspapers say, and as is too probable, the change will be almost fatal: for the Members of Council are the only high administrative Officers not dependent on the will of the Governor-General, and their Minutes are the only Channel through which an independent and ungarbled opinion necessarily reaches the home authorities. The difficulties of governing India have so much increased, while there is less and less wisdom employed in doing it, that I begin to despair of the whole subject, and almost believe that we are at the beginning of the end."

It was in 1860, that he wrote his volume on *Representative Government*. The state of the Reform question, which led him to prepare his pamphlet on Reform, was the motive of the still

larger undertaking, his principal contribution to a Philosophy of Politics. He says in the Preface, that the chief novelty of the volume is the bringing together, in a connected form, the various political doctrines that he had at various times given expression to : but the mere fact of viewing them in connexion necessarily improved their statement and bearings ; and the six or eight months' additional elaboration in his fertile brain could not but infuse freshness into the subject.

In my estimate of Mill's genius, he was first of all a Logician, and next a social philosopher or Politician. The *Political Economy* and the *Representative Government* constitute his political outcome. People will differ as to his conclusions, but certainly whoever wishes to judge of any matter within the scope of the *Representative Government* should first see what is there said upon it ; and the work must long enter into the education of the higher class of politicians. The chapter on the "Criterion of a good form of Government" contains an exceedingly pertinent discussion of the relation between Order and Progress ; and demonstrates that Order cannot be permanent without Progress ; a position in advance of Comte. The third chapter demolishes the fond theory entertained by many in the present day that the best government is "Absolute authority in good hands". Then comes a question that needs all the author's delicacy, tact, and resource—Under what conditions is representative government applicable ? But his strongest point throughout is the exposition of the dangers and difficulties attending on Democracy. This was one of his oldest themes in the *Westminster Review* ; he has put it in every possible light, and discussed with apostolic ardour all the contrivances for withstanding the tyranny of the majority. He took up with avidity Mr. Hare's scheme of Representation, and never ceased to urge it as the greatest known improvement that representative institutions are susceptible of. He dismisses Second Chambers as wholly inadequate to the purpose in view, however useful otherwise. The discussions



on the proper functions of the Local Governing Bodies, on Dependencies, and on Federations, are all brimful of good political thinking. He passes by the subject of Hereditary Monarchy. Both he and Grote were republicans in principle, but they regarded the monarchy as preferable to the exposing of the highest dignity of the state to competition. From my latest conversations with Mill, I think he coincided in the view that simple Cabinet Government would be the natural substitute for Monarchy.

In 1861, he began to turn his thoughts to a review of Hamilton's Philosophy. Writing to me in November, he says, "I mean to take up Sir William Hamilton, and try if I can make an article on him for the *Westminster*". He chose the *Westminster* when he wanted free room for his elbow. He soon abandoned the idea of an article. In December he said:—"I have now studied all Sir W. Hamilton's works pretty thoroughly, and see my way to most of what I have got to say respecting him. But I have given up the idea of doing it in anything less than a volume. The great recommendation of this project is, that it will enable me to supply what was prudently left deficient in the *Logic*, and to do the kind of service which I am capable of to rational psychology, namely, to its *Polemik*."

A month before, he had written to Thornton, in terms that showed how well he had recovered his natural buoyant spirits, and his enjoyment of life.

"Lie here is uneventful, and feels like a perpetual holiday. It is one of the great privileges of advanced civilization, that while keeping out of the turmoil and depressing wear of life, one can have brought to one's doors all that is agreeable or stimulating in the activities of the outward world, by newspapers, new books, periodicals, &c. It is, in truth, too self-indulgent a life for any one to allow himself whose duties lie among his fellow-beings, unless, as is fortunately the case with me, they are mostly such as can be better fulfilled at a distance from their society, than in the midst of it."

He was interrupted for a time by the events in America. In January, 1862, he wrote in *Fraser* his paper on the Civil War. He expected it to give great offence, and to be the most hazardous thing for his influence that he had yet done.

After spending the summer in a tour in Greece and Asia Minor, he wrote again on the American Question, in a review of Cairnes's book in the *Westminster*. This done, he set to the *Hamilton*, which was the chief part of his occupation for the next two years. His interruptions were—the article on John Austin in the *Edinburgh*, in Oct., 1863, the two articles on Comte to the end of 1864, and the revision of the *Political Economy*.

I had a great deal of correspondence with him while he was engaged with Hamilton. He read all Hamilton's writings three times over; and all the books that he thought in any way related to the subjects treated of. Among other things, he wrote me a long criticism of *Ferrier's Institutes*. "I thought Ferrier's book quite *sui generis* when I first read it, and I think so more than ever after reading it again. His system is one of pure scepticism, very skilfully clothed in dogmatic language." He was much exercised upon the whole subject of Indestructibility of Force. His reading of Spencer, Tyndall, and others, landed him in a host of difficulties, which I did what I could to clear up. His picture of Hamilton grew darker as he went on; chiefly from the increasing sense of his inconsistencies. He often wished that Hamilton was alive to answer for himself. "I was not prepared for the degree in which this complete acquaintance lowers my estimate of the man and of his speculations. I did not expect to find them a mass of contradictions. There is scarcely a point of importance on which he does not hold conflicting theories, or profess doctrines which suppose one theory while he himself holds another. It almost goes against me to write so complete a demolition of a brother philosopher after he is dead, not having done it while he was alive."

During my stay in London in the summer of 1864, he showed me the finished MS. of a large part of the book. I offered a variety of minor suggestions, and he completed the work for the press the same autumn.

Of the many topics comprised in the volume, I shall advert only to one or two of the principal. After following Hamilton's various theories through ten chapters, he advances his own positive view of the Belief in an External World. Having myself gone over the same ground, I wish to remark on what is peculiar in his treatment of the question.

I give him full credit for his uncompromising Idealism, and for his varied and forcible exposition of it. In this respect he has laboured to educate the thinking public in what I regard as the truth. But in looking at his analysis in detail, while I admit he has seized the more important things, I do not exactly agree with him either as to the order of statement, or as to the relative stress put upon the various elements of the Object and Subject distinction.

In the first place, I would remark on the omission of the quality of *Resistance*, and of the muscular energies as a whole, from his delineation of the object or external world. In this particular, usage and authority are against him, to begin with. The connexion of an External World with the Primary Qualities has been so long prevalent, that surely there must be some reason or plausibility in it. His own father and Mansel are equally emphatic in setting forth Resistance as the foundation fact of Externality. Mill himself, however, allows no place for Resistance in his psychological theory. In a separate chapter on the Primary Qualities of Matter, he deals with Extension and Resistance, as products of muscular sensibility, and as giving us our notions of *Matter*, but he thinks that simple tactile sensibility mingles with resistance, and plays as great a part as the purely muscular ingredient; thus frittering away the supposed antithesis of muscular energy and passive sensibility. Now, for my own part, I incline to the usage and opinion of our pre-

decessors in putting forward the contrast of active energy and passive feeling as an important constituent of the subject and object distinction; and, if it is to be admitted at all, I am disposed to begin with it, instead of putting it last as Mr. Spencer does, or leaving it out as Mill does. It does not give all that is implied in Matter, but it gives the nucleus of the composite feeling, as well as the fundamental and defining attribute.

The stress of Mill's exposition rests on the *fixity of order* in our sensations, leading to a constancy of recurrence, and a belief in that constancy, which goes the length of assuming independent existence. Although he shows a perfect mastery of his position, I do not consider that he has done entire justice to it, from not carrying along with him the full contrast of the objective and the subjective—the Sensation and the Idea. Indeed, the exposition is too short for the theme; the reader is apt to be satisfied with the portable phrase—"permanent possibility of sensation," which helps him to one vital part of the case, but does not amount to a satisfactory equivalent for an External and Independent World. There would have been more help in an expression dwelling upon the "common to all," in contrast with the "special to me," to use one of Ferrier's forms of phraseology. This ground of distinction is not left unnoticed by Mill, but it is simply mentioned.

His chapter applying the theory to our belief in the permanent existence of Mind is, I think, even more subtle than the preceding one on Matter. The way of disposing of Reid's difficulty about the existence of his fellow-creatures is everything that I could wish. It is when, in the concluding paragraph, he lays down, as final and inexplicable, the Belief in Memory, that I am unable to agree with him. This position of his has been much dwelt upon by the thinkers opposed to him. It makes him appear, after all, to be a transcendentalist like themselves, differing only in degree. For myself, I never could see where his difficulty lay, or what moved him to say

that the belief in memory is incomprehensible or essentially irresolvable. The precise nature of Belief is no doubt invested with very peculiar delicacy, but, whenever it shall be cleared up, we may very fairly suppose it capable of accounting for the belief that a certain state now past as a sensation, but present as an idea, was once a sensation, and is not a mere product of thought or imagination. (*Cf. The Emotions and the Will*, 3rd. edit., p. 532.)

I may make a passing observation on the chapter specially devoted to Mansel's *Limits of Religious Thought*. It is a considerable digression in a work devoted to Hamilton; but Mansel's book touched Mill to the quick; in private, he called it a "loathsome" book. His combined argumentative and passionate style rises to its utmost height. Mansel sarcastically described his famous climax—"to hell I will go"—as an exhibition of taste and temper. That passage was scarcely what Grote called it, a Promethean defiance of Jove, inasmuch as the fear of hell never had a place in Mill's bosom; it sprang from the strength of his feelings coining the strongest attainable image to give them vent.

Mill could not help adverting to Hamilton's very strong and paradoxical assertions about Free-Will; but, as he never elaborates a consecutive exposition of the question, I doubt the propriety of making these assertions a text for discussing it at full. Mill's chapter is either too much or too little; too much as regards his author, too little as regards the subject. The connexion of Punishment with Free-will should be allowed only under protest; the legitimacy and the limits of punishment make a distinct inquiry. Punishment, psychologically viewed, assumes that men recoil from pain; there may be other springs of action besides pain or pleasure; but as regards such, both re-

\* Grote thought that the phrase was an echo of something occurring in Ben Jonson; where a military captain's implicit obedience is crowned by the illustration—"Tell him to go to hell, to hell he will go". I have never got any clue to the place.

ward and punishment are irrelevant. I think Mill very successful in showing that moral good and evil are noways bound up with the question of the Will. He is not too strong in his remonstrance against Hamilton's attempt to frighten people into Free-Will by declaring that the existence of the Creator hangs upon it. It was quite in Hamilton's way to destroy all the other arguments in favour of a doctrine that he espoused, in order to give freer course to his own. He damages the advocacy of Free-Will by his slashing antinomy of the two contrary doctrines. It is certainly a clearing of the ground, if nothing more, to affirm, as he does so strongly, that "a determination by motives cannot escape from necessitation". Such admissions give an opponent some advantage, but only as respects him individually. The general controversy, however, must proceed on different lines from his, and hence the waste of strength in following his lead.

Hamilton's attack on the study of Mathematics was a battery of learned quotations intended to confound Whewell and Cambridge. It is not very convincing; it hardly even does what Mill thinks hostile criticism tends to do, namely, to bring out the half-truth neglected by the other side. It was not worth while to write so long a chapter in reply; but Mill, partly from what he learnt from Comte, and partly from his own logical studies, had a pat answer to every one of Hamilton's points. Most notable, in my view, is the paragraph about the disastrous influence of the mathematical method of Descartes on all subsequent speculation. He seems there to say that the *a priori* spirit has been chiefly kept up by the example of Mathematics. Now, I freely admit that the axioms of mathematics have been the favourite illustration of Intuition; but there is no certainty that, in the absence of that example, Intuitionism would not have had its full swing during the last two centuries. Mill admits that the crudity of Bacon's Inductive canons had an equally bad effect on English speculation; but all this shows simply that error is the parent of error.

The two subjects taken up while the *Hamilton* was still in hand—John Austin and Comte—deserve to be ranked among the best of his minor compositions. The “Austin” article took him back to his early days when he worked with Bentham and attended the lectures of Austin at University College. It does not seem to contain much originality, but it is a logical treat. The two “Comte” articles are still more valuable, as being Mill’s contribution to the elucidation of Comte’s Philosophy. It will be long ere an equally searching and dispassionate estimate of Comte be given to the world; indeed, no one can again combine the same qualifications for the work.

The publication of the *Hamilton* in the spring of 1865 was followed by a crowd of events. Mill had already embarked on an article on Grote’s *Plato*, which had lately appeared. He had arranged with his publisher for cheap reprints of the *Political Economy*, the *Liberty*, and the *Representative Government*. Then came the requisition to stand for Westminster, by which his name blazed out into a sudden notoriety, under which the cheap volumes went off like wildfire, while there was an increased demand for the *Logic*. His letter, announcing his compliance with the requisition on certain conditions, was a surprise. It was scarcely to be expected that he could feel himself “honoured” by being elected to Parliament, in the maturity of his great reputation. Perhaps we must go farther back to account for his ready compliance. He had felt it acutely, as a disadvantage of his being placed in the India House, that he could not enter Parliament; and again, in the days when he was heading the philosophic radicals, he was conscious of the weakness of his position in not being himself in the House of Commons. He had not yet ceased to be a practical politician, although he had become many things besides; and the long slumbering idea of being in Parliament was suddenly awakened into life. His anticipation of success in the election was not sanguine; but his supporters were

enthusiastic, and his appearance at the meetings of the electors procured daily accessions to his cause. He had been hitherto very little seen by the public: and neither friends nor foes had any adequate conception of his resources and his readiness as a speaker. Above all things, the attempts to entrap him by cunningly devised questions most signally recoiled upon the authors.

Half of his year for the next three years was given up to attendance in the House and engrossment with public questions. I am not about to criticize his career as a member of Parliament. The part of the *Autobiography* where he is perhaps most self-complacent, is what relates to his speeches and doings in that capacity. He set a good example of perfect party loyalty, combined with the assertion of difference of opinion on particular questions. For a number of years his relations with Mr. Gladstone had been far more cordial and intimate than the outer world was aware of. His idea of ventilating questions that had as yet scarcely any supporters, appears to me to be carried to an extreme. He was not an orator physically; but he composed and delivered speeches possessing all the qualities of his published writings; that is to say, original in thought, powerfully reasoned, and full of passionate fire when the occasion demanded.

In the six months' recess he carried on his philosophical and other writings. In the autumn and winter of 1865, he had to finish his long article on *Plato*, on which he bestowed great pains, having taken the trouble to re-read the whole of Plato in the original. To the reader of Grote, the article does not impart much that is absolutely new; but, Plato being an early subject of his as well as of his father's, his handling has freshness and gusto.

The extraordinary stimulus given to the sale of his books prematurely exhausted the current edition of the *Logic*; and it had been his intention to revise it for the next edition (the Sixth). This had to be seen to, along with the "*Plato*," during



the same recess. His revision, on this occasion, partly consisted in improving the "Induction" by new examples. I referred him to Brown Séquard's interesting research on Cadaveric Rigidity, and induced him to read the same author's volume of *Researches on the Nervous System*. I also obtained from Thomas Graham a complete set of his researches on Gases and Liquids; pointing his attention to what I thought most available. It was in this edition that he first combated Mr. Spencer's doctrine of "The Inconceivability of the Opposite" as a test of truth.

The same winter recess was not allowed to conclude without another distraction. The students of St. Andrews had, without asking his leave, elected him Lord Rector. On its being announced to him, he wished to decline. This, however, was not easy after the thing was done; and he accepted on the understanding that he was not to deliver the Rectorial Address till next year.

Meantime, his letters to me were full of the notices that had come out on the *Hamilton*. When the session of 1866 was concluded, after a tour in the Alps and Pyrenees, he settled down at Avignon to write his Address for St. Andrews, and to answer the attacks on *Hamilton* for the third edition; both which feats he accomplished before the opening of the session of 1867.

The St. Andrews Address was a very lengthened performance; its delivery lasted three hours. It aimed at a complete survey of the Higher Education. Its absolute value is considerable; but in relation to the time, place, and circumstances, I consider it to have been a mistake. Mill had taken it into his head that the Greek and Roman classics had been too hardly pressed by the votaries of science, and were in some danger of being excluded from the higher teaching; and he occupies nearly half of the address in vindicating their importance. The second half is a vigorous enforcement of the claims of Science.

' The performance was a failure, in my opinion, for this simple reason, that he had no conception of the limits of a University curriculum. The Scotch Universities have been distinguished for the amount of study comprised in their Arts Degree. Mill would have them keep up the Classics intact, and even raise their standard ; he would also include a complete course of the Primary Sciences—Mathematics, Physics, Chemistry, Physiology, Logic, and Psychology—to which he would add Political Economy, Jurisprudence, and International Law. Now at present the obligatory sciences are Mathematics, Natural Philosophy, Logic, and Moral Philosophy. If he had consulted me on this occasion, I should have endeavoured to impress upon him the limits of our possible curriculum, and should have asked him to arbitrate between the claims of Literature and Science, so as to make the very most of our time and means. He would then have had to balance Latin and Greek against Chemistry, Physiology, and Jurisprudence ; for it is quite certain that both these languages would have to be dropped absolutely, to admit his extended science course. In that case he would have been more careful in his statements as to the Greek and Latin languages. He would not have put these languages as synonymous with "literature" ; and he would have made much more allowance for translations and expositions through the modern languages. He would have found that at the present day we have other methods of correcting the tendency to mistake words for things than learning any two or three additional languages. He would not have assumed that our pupils are made all "to think in Greek" ; nor would he have considered it impossible to get at the sources of Greek and Roman History without studying the languages. If he had had a real opponent, he would not have given the authority of his name to the assertion that Grammar is "elementary Logic". His mode of speaking of the style of the ancient writers, to my mind at least, is greatly exaggerated. "Look at an oration of Demosthenes ; there is nothing in it

which calls attention to itself as style at all." "The Athenians do not cry out—What a splendid speaker, but—Let us march against Philip." He also gives way to the common remark that the teaching of Latin and Greek could be so much improved as to make it an inconsiderable draft upon a pupil's energies. On this point he had no experience to go upon but his own, and that did not support his position.

In the scientific departments he carries out strictly the Comte hierarchy of the fundamental sciences, and, in this respect, the address was valuable as against the mischievous practice of culling out a science from the middle of the series, say Chemistry, and prescribing it by itself to the exclusion of its forerunners in the hierarchy. While he speaks fairly and well on the Mathematical and Physical Sciences, his remarks on the Moral and Political display, as usual, the master's hand. He next goes on to talk of Free Thought, on which he maintains a somewhat impracticable ideal for our Universities. From Science he proceeds to Art, and enforces a favourite theme—the subservience of Poetry to Virtue and Morality. One feels that on this topic a little more discrimination was necessary; art being a very wide word. His conclusion was a *double entendre*. "I do not attempt to instigate you by the prospect of direct rewards, either earthly or heavenly; the less we think about being rewarded in either way, the better for us."

In the reception given to the Address, he was most struck with the vociferous applause of the Divinity students at the Free-thought passage. He was privately thanked by others among the hearers for this part.

The Third Edition of the *Hamilton* contained replies to the host of critics that had assailed it. The additional scope given to the author's polemical ability greatly enhanced the interest of the book. In answering the attacks made on his criticism of Hamilton's doctrines on the Relativity of Knowledge and Philosophy of the Conditioned, as well as in the reply to Mansel on

Religion, he showed to considerable advantage. In defending the Psychological Theory of the Belief in an External World, he grappled with the stock arguments against Idealism. He made least way in the Free-Will controversy ; affording, as I think, a confirmation of the impropriety of carrying on so many distinct questions together.

His next literary project was the editing his father's *Analysis*. This was commenced in the recess of 1867, and finished in the following year, being brought out early in 1869. He called it "a very great relief from its extreme unlikeness to parliamentary work, and to parliamentary semi-work, or idleness". I had necessarily a long correspondence with him on the allocation of topics ; but each of us took our own line in regard to the doctrines. Coincidence of view was the rule, the discrepancy seldom went beyond the mode of statement, the chief exception being the topic of Belief. The work contains perhaps the best summary of his psychological opinions, although the *Hamilton* shows them in the more stirring shape of polemics.

Before this work came out, his Parliamentary career was at an end. The circumstances that led to his defeat in the election of 1868 are detailed by himself. They included the singular indiscretion of his allowing his subscription to Mr. Bradlaugh to be made public before his own election day ; very unlike his usual circumspectness. His apology is somewhat lame ; and does not take account of the fact that he was contesting the seat in the interest of other people and at their expense. So energetically did the opposition ply the weapon thus put into their hands, that they may have owed their success to it alone. Although on public grounds he regretted being no longer in Parliament, he was not sorry to resume his quiet and his leisure for other work.

The pamphlet entitled *England and Ireland*, brought out in

the beginning of 1868, declared, as he says, his whole mind on the subject of Ireland—chiefly as regarded the Land—and is couched in very strong language indeed. He believed that this pamphlet helped to determine Mr. Gladstone to commence his Irish Legislation with the Church, leaving the Land to a later operation.

The year 1869, his first year of release, saw the publication of his last book—*The Subjection of Women*, together with the two first articles in his fourth volume of *Dissertations*—"Endowments," and "Labour and its claims," a review of Mr. Thornton's work on that subject.

The volume on the *Subjection of Women*, he tells us, was first written in 1861. It was, he says, a joint production; portions were written by Miss Taylor, while his share was the result of innumerable conversations and discussions with his wife. However the merits be partitioned, it is a book of very marked character. It is the most sustained exposition of Mill's life-long theme—the abuses of power. The extent of the illustration and the emphasis of the language render it the best extant homily on the evils of subjection in general; while the same arts are maintained in dealing with the application to the disabilities of women. This case, which of all others most engaged his feelings, is, I think, the one instance where he may be charged with overstraining. In discussing political freedom at large, he is always sufficiently alive to the necessities of government; in the present question, he leads us to suppose that the relations of men and women between themselves may work upon a purely voluntary principle. He abstains here and elsewhere from advocating divorce pure and simple, because of the complications attending the question: while he does not show what is the remedy when a man and a woman, united by the marriage bond, are unable to co-operate as equal partners.

His handling of the mental equality of the sexes is, to my

mind, open to exception. In the intensity of his special pleading on this question, he hardly avoids contradicting himself; while he postulates a degree of equality that does not chime in with the experience of the least biassed observers. He grants that women are physically inferior, but seems to think that this does not affect their mental powers. He never takes account of the fact, that the large diversion of force for the procreative function must give some general inferiority in all things where that does not come in, unless women are made on the whole much stronger than men. In an allusion to his experience of the Independent States of India, he tells us that in three cases out of four, if a superior instance of good government occurs, it is in a woman's reign; which looks like the fallacy of proving too much.

Without entering into an argument with him on his equality view, I expressed my doubts as to the expediency of putting this more strongly than people generally would be willing to accept; inasmuch as the equality of rights did not presuppose absolute equality of faculties. He replied with much warmth, contending that the day of a temporizing policy was past; that it was necessary to show, not simply that the removal of restrictions would leave things as they are, but that many women are really capable of taking advantage of the higher openings. And further, he urged, it was necessary to stimulate the aspirations of women themselves, so as to obtain proofs from experience as to what they could do.

In Sir James Stephen's work, the question of the Subjection of Women undergoes a very full handling; and the conclusions reached are of course entirely different from Mill's. This is his remark in introducing the subject:—

“I might give in proof or illustration of this the whole of his essay on the Subjection of Women, a work from which I dissent from the first sentence to the last, but which I will consider on the present occasion only with reference to the particular topic of equality, and as the strongest distinct illus-

tration known to me of what is perhaps one of the strongest, and what appears to me to be by far the most ignoble and mischievous of all the popular feelings of the age."

Sir James's concessions, however, are important :—

"I freely admit that in many particulars the stronger party has in this, as in other cases, abused his strength, and made rules for his supposed advantage, which in fact are greatly to the injury of both parties. It is needless to say anything in detail of the stupid coarseness of the laws about the effects of marriage on property, laws which might easily be replaced by a general statutory marriage settlement analogous to those which every prudent person makes who has anything to settle. As to acts of violence against women, by all means make the law on this head as severe as it can be made without defeating itself. As to throwing open to women the one or two employments from which they are at present excluded, it is rather a matter of sentiment than of practical importance."

A considerable portion of his labours during the last three years of his life was given to the Land Question, which he greatly helped to mature for future settlement. Under this movement he renewed his former fight for peasant properties, and started the new heresy of the unearned increment. It was his pride to co-operate in all these questions with the working classes and their leaders, and, had he lived, he would have been of unspeakable value as a mediator in the impending struggles between labour and capital, and between the working population generally and the heads of political parties. He would not, however, I think, ever have been a working-men's champion on their own lines. He would not have held out any tempting bribe of immediate amelioration such as to inspire the highest efforts of the existing generation. His most sanguine hopes were of a very slow progress in all things ; with the sole exception, perhaps, of the equality-of-women question, on which his feelings went farther than on any other.

Grote died in June, 1871. Mill disliked his being buried in the Abbey, but of course attended the funeral. He resisted the proposal that he should be one of the pall-bearers, and gave way only under great pressure. As he and I walked out together, his remark was — "In no very long time, I shall be laid in the ground with a very different ceremonial from that".\* He seemed to be now conscious of a break-up in his physical system. He had in the course of the next two years several prostrating attacks, but with marvellous recoveries. His last illness, as is well known, was due to a local endemic disease. Three days before his death, he had walked fifteen miles on a botanical excursion. There was evidently still a reserve of power in his constitution, which might have tided him over several more years of useful work, but could not carry him through a malignant infection.

The posthumous *Essays on Religion* do not correspond with what we should have expected from him on that subject. Never, so far as I know, did he give any hint of wishing or attempting to re-construct a system of theism on a scientific basis. In one sentence in the *Hamilton* he spoke approvingly of the argument from Design, but laid more stress on its persuasiveness than on its soundness. The *Autobiography* represented his attitude towards Religion as pure negation, or nescience, just as his father's had been.

The Essay on *Nature* paints the world black enough, and from that he was not likely to rise to a flattering estimate of Nature's God. I think he should have widened his survey considerably, before pronouncing as he does. For, although there are good grounds for many of his statements of fact, the case is by no means complete. By his own showing in other places, many happy lives have been passed in the world as we

\* It so happened, however, that a prayer was delivered at his own interment, by the protestant pastor at Avignon, who thereby got himself into trouble, from Mill's known scepticism, and had to write an exculpation in the local newspaper. Mill had made a friend of this pastor, a very intelligent and liberal-minded man.



find it, and he looked forward to a time when happiness might be the rule instead of the exception. I should have expected him to push the analysis of the causes of evil a step farther; namely, first, to the inadequacy of man's intellectual force to cope with the obscurities of nature, and next to the want of ability to counteract known causes of mischief. A remark that he once made regarding his own temperament, is a part of the case in considering nature: he said, in answer to some gloomy utterance of Grote's, that with himself the difficulty was not so much to realize pleasure as to keep off pain; and it is the fact that there are many pleasurable resources in the world, if we could only submerge the attendant miseries. His exposure of the insufficiency of Nature as a *guide* is pure logic, and in that he was not likely to be wanting. The so-called Light of Nature is mere darkness; while we are often notoriously incapable of following the light we have. We are only just beginning to track the secrets of disease; including the forms of pestilence that from time to time commit wholesale ravages alike upon man and beast.

The Essay on the *Utility of Religion* is a farther illustration of his old theme (in the *Utilitarianism*) as to the sufficiency of the sanctions and motives of the present life for sustaining, not only the inferior moral virtues, but also the elevated sentiments of mankind. He here puts forward a sort of Religion of Humanity, constructed on the basis of men's amiable feelings towards one another. To this he had been led, I have no doubt, in the first instance, by Comte, although the filling-up is his own.

But by far the most laboured of the Essays is the last—uniting a destructive and a constructive *Theism*. The destructive part is in accordance with all his antecedents; it is the constructive part that we were not prepared for. It was indeed quite compatible with his warm human sympathies, and with his long-standing doctrine that every creed is likely to contain some portion of truth, that he should try to ascertain

what there was in religion to commend it to the best minds among its adherents: our doubt would have been whether, after painting the world in such gloomy hues, he could set up a Deity that would replace, in the hearts of men, the one that he undertook to destroy. Religion, we know, is exceedingly variable; but there are some things in it not easy to dispense with. Until the advent of the modern sentimental Theism, it has usually contained the idea of authority and subjection—the prescription of duties with rewards and punishments attached to them. Men's deities in all early ages had to be propitiated as powers capable of evil at least, if not also of good. In pure Monotheism, the unbounded beneficence of the Deity has been an indispensable attribute, in spite of the difficulties attending it. Plato insisted that this belief should be supported by state penalties; and we know how essential it is regarded in the present day by those of the Theists that do not accept revelation. All these points of support Mill dispensed with; while working upon the idea, so repugnant to the religious worshipper, of putting a logical limitation and restriction on the great object of worship. A Being that would not interfere to do us either harm or good can scarcely excite in us any strong regards; at least until we have undergone a new education. The supposed limitations of his power, besides being strangely at variance with the undeniable vastness and complex adjustment of the world, would seem fatal to his ascendancy in our minds.

The speculation is equally precarious as regards a future life. Mill hardly does justice to the natural difficulties of reproducing human existence, after death, for an eternal duration; and yet casts doubts on the omnipotence of the Power that is to perform the miracle.

Seeing that the only argument for Theism that Mill put any value upon, was the argument from Design, it is unfortunate that he should have considered nine pages sufficient for its discussion. The handling is not only short, but extremely

unsatisfactory. It is what we might suppose to be the first of the three redactions that all his writings went through ; a mere rough note, to be worked up in one or two subsequent elaborations. His attempt to show that the argument rises above Analogy into the sphere of Induction is not, as I conceive, a logical success ; at least, it stands in need of a much more detailed justification. He ought manifestly to have disposed of the objections advanced by Hume and Kant respectively : in so doing, he would have made his own position clearer, if not stronger. He very properly introduces into the case the canons of Induction, strictly so called, and the conditions (first distinctly stated by himself) of proof from Analogy ; he ought farther to have brought into play his doctrine of what constitutes a logical Hypothesis, and have shown the bearings of this upon the supposed Anthropomorphic origin of the Universe.

Both his Theism and his estimate of Christianity as founded on the character of Christ, are concessions to the existing Theology ; and, as is usual in such cases, the inch has been stretched to an ell. As regards the beneficial influence that may continue to be exerted by our contemplation of Jesus Christ, I quote a few sentences as the groundwork of some remarks.

"Above all, the most valuable part of the effect on the character which Christianity has produced by holding up in a Divine Person a standard of excellence and a model for imitation, is available even to the absolute unbeliever and can never more be lost to humanity. For it is Christ, rather than God, whom Christianity has held up to believers as the pattern of perfection for humanity. It is the God incarnate, more than the God of the Jews or of Nature, who being idealised has taken so great and salutary a hold on the modern mind. And whatever else may be taken away from us by rational criticism, Christ is still left ; a unique figure, not more unlike all his precursors than all his followers, even those who had the direct benefit of his personal teaching. It is of no use to say that

Christ as exhibited in the Gospels is not historical and that we know not how much of what is admirable has been superadded by the tradition of his followers. The tradition of followers suffices to insert any number of marvels, and may have inserted all the miracles which he is reputed to have wrought. But who among his disciples or among their proselytes was capable of inventing the sayings ascribed to Jesus or of imagining the life and character revealed in the Gospels? Certainly not the fishermen of Galilee ; as certainly not St. Paul, whose character and idiosyncrasies were of a totally different sort."

"But about the life and sayings of Jesus there is a stamp of personal originality combined with profundity of insight, which, if we abandon the idle expectation of finding scientific precision where something very different was aimed at, must place the Prophet of Nazareth, even in the estimation of those who have no belief in his inspiration, in the very first rank of the men of sublime genius of whom our species can boast. When this pre-eminent genius is combined with the qualities of probably the greatest moral reformer, and martyr to that mission, who ever existed upon earth, religion cannot be said to have made a bad choice in pitching on this man as the ideal representative and guide of humanity ; nor, even now, would it be easy, even for an unbeliever, to find a better translation of the rule of virtue from the abstract into the concrete, than to endeavour so to live that Christ would approve our life. When to this we add that, to the conception of the rational sceptic, it remains a possibility that Christ actually was what he supposed himself to be—not God, for he never made the smallest pretension to that character and would probably have thought such a pretension as blasphemous as it seemed to the men who condemned him—but a man charged with a special, express, and unique commission from God to lead mankind to truth and virtue ; we may well conclude that the influences of religion on the character which will remain after rational criticism has done its utmost against the evidences of religion, are well worth preserving, and

that what they lack in direct strength as compared with those of a firmer belief, is more than compensated by the greater truth and rectitude of the morality they sanction."

It seems, at first glance, a bold proceeding to take to pieces the Christ of Christianity, and to appropriate just so much of him as suits a "rational criticism". Something of this kind has already been tried by the Unitarians, but with small success, if that is to be measured by the extent of popular reception. It would seem, in this as in other parts of religion, that what the rationalist disapproves of most, the multitude like best.

We are, of course, at liberty to dissent from the prevailing view, which makes Christ a divine person. But to reduce a Deity to the human level, to rank him simply as a great man, and to hold ideal intercourse with him in that capacity, is, to say the least of it, an incongruity. Historians and moralists have been accustomed to treat with condemnation those monarchs that, after being dethroned, have accepted in full the position of subjects. Either to die, or else to withdraw into dignified isolation, has been accounted the only fitting termination to the loss of royal power. So, a Deity dethroned should retire altogether from playing a part in human affairs, and remain simply as an historic name.

The point of congruity or propriety is not, as I conceive, the worst objection to Mill's proposal. The doctrines, prescriptions, or sayings of one believed to be a God, must all have a religious bearing; they are properly adapted to men in their religious capacity. They may often refer to matters of mere worldly conduct, but the religious side is still a vital part of them. If religion were done away with, to the extent that Mill would have it, those sayings of Christ must lose their suitability to human life as so transformed. "Forgive that ye may be forgiven (by God)"—is no longer applicable. The best guidance, under such altered circumstances, would be that furnished by the wisest of purely secular teachers. The same applies to Christ as an example. He is so to those that accept him in his own

proper character, and who view the world as he viewed it. In a purely secular scheme of life, the ideal that he holds forth must seem greatly over-strained.

Mill was, doubtless, able to state and to give reasons for his own view of the plan of the universe. He was also highly qualified to discuss particular portions of the groundwork of the prevailing creeds. I think, however, that he was too little versed in the writings of Theologians, to attack their doctrines with any effect. He absented himself during his whole life, except as a mere child, from religious services. He scarcely ever read a Theological book. He could not help knowing the main positions of Theology from our general literature. That, however, was scarcely enough for basing an attack upon Christianity along the whole line. Just about the time when the *Essays on Religion* appeared, Strauss's last book, called "*The Old Faith and the New*," was published in this country. Anyone reading it would, I think, be struck with its immense superiority to Mill's work, in all but the logic and metaphysics. Strauss speaks like a man thoroughly at home with his subject. He knows both sides as a life-study can enable one to know them. Mill, even supposing him to be in the right, would not be convincing. He may puzzle opponents, he may compel them to change front; still, he does not meet their difficulties, nor take account of what they feel to be their strength. He is not even well read in the sceptics that preceded him. If he had studied the whole cycle of Hume's argumentative treatises, so lucidly condensed by Mr. Leslie Stephen, he might have put his case on the negative side much better, while he would have been led to modify his constructive Theism.

It has been said by his opponents, with some show of plausibility, that Mill was at bottom a religious man. Setting aside special dogmas, and looking only to the cheering influence of religion on its most favourable side—an influence that may be exerted in a variety of ways—we may call his aspirations and

hopes for a bright future to the race, a religion of humanity. To hold up an ideal that involves no contradictions to our knowledge, to inspire and elate the mind, oppressed by the dulness and the hardships of the present life,—will be accepted by many as comfort of the spiritual kind, the real analogue of religion. And something of this effect is undoubtedly produced by Mill's later writings. With all this, however, the fact remains, that in everything characteristic of the creed of Christendom, he was a thorough-going negationist. He admitted, neither its truth nor its utility. His estimate of its best side is given in the remark to a friend under domestic sorrow—“To my mind the only permanent value of religion is in lightening the feeling of total separation which is so dreadful in a real grief”.

## CHAPTER V.

### CHARACTER AND INFLUENCE.

ON Mill's general character, little remains for me to say. His writings, his career, his numerous critics, and last, but not least, his *Autobiography*, have sufficiently shown what manner of man he was. Any additional contribution is justifiable mainly on the supposition of enabling us better to seize the central features, and to make the whole more consistent throughout. There are, moreover, some anomalous passages in his life, upon which the last word has not yet been said.

Mill had, I believe, a very fine constitution physically. His father's brain was encased in an admirable framework. His muscle was good to the last; and his nutritive powers failed only in consequence of a strain that they should never have been subjected to. The nervous system was habitually kept at a high tension all through; this cannot be done for nothing.

The general cast of his mental powers was high in all the regions of mind. With a predominance of Intellect, he had great power of Will, and unusual depth of Feeling. He had pre-eminently the sanguine temperament. Whenever the general system was in working order, enjoyment was with him the natural result. He was, I think, born for a happy life, if he had got only tolerably fair play. It was not the fault of nature that he was so often in the depths: his power of recovery attests the vital force of the system.

There can be little hesitation as to the specialities of his Intellect. These were soon brought out by his early education, so far as books could do it. Every species of literature was



presented to his mind ; and, while he imbibed something of all, it soon became evident that science was his *forte*. He had an intellect for the abstract and the logical, out of all proportion to his hold of the concrete, and the poetical. His attempts at writing poetry could be little more than memory working upon the books that he had read, while their impression was fresh. He never attained to picturesqueness in the smallest degree ; he could no doubt have succeeded by set purpose, but he had other matters to attend to. He was but moderately endowed with the faculty of language as such ; the undoubted excellence of his mature style was arrived at by a series of efforts that may well be celebrated among triumphs of perseverance.

I think it perhaps a fortunate adjustment, to have possessed merely enough verbal power to give adequate expression to his thoughts, and not enough to make an artist to the extent occasionally realized even with great philosophers. That the thinking faculty, pure and simple, should have the predominating share of his intellectual force, was the condition of his peculiar subtlety as a thinker. Plato, Bacon, Berkeley, Hume, Ferrier, and others, paid for the goodness of their style, by some inferiority of their thoughts. Aristotle and Kant were perhaps at the other extreme ; their gifts of style were unequal to the adequate presentation of their ideas.

Mill had not much memory for detail of any kind. He had read a vast quantity of history, of fiction, of travels and incidents ; but you would not be aware of the fact from his conversation or from his writings. Neither in the illustration of doctrines, nor for figurative allusions, was he ready at reproducing facts in the concrete. He was, as a youth, well read in the Greek and Roman classics, but he scarcely ever made a happy original quotation.\* By express study, and frequent reference, he had amassed a store of facts bearing on political or sociological doctrines ; and these he had at full command.

The enormous devotion of his early years to book study interfered with his activity as an observer of facts at first hand,

whether in the physical, or in the mental world. He did, nevertheless, show a considerable wakefulness to what went on within his circle, yet with decided limitations. He could have imbibed physical facts with avidity, if his circumstances had been favourable; but his opportunities were very few. He was perhaps all the more disposed to notice mental and social facts; and it is wonderful how many of these he took hold of, in the remissions of book study. Of course, the larger mass of sociological details had to be gathered through books; yet a certain quantity of personal observation was needed as a basis for comprehending those that came by the other sources. His power of psychological observation was also good, and served him both as a theoretical psychologist, and as a practical philosopher, more especially in ethics, and in politics.

We come finally to the great distinguishing feature of such a mind as his: the rich storage of principles, doctrines, generalities of every degree, over several wide departments of knowledge. Principles had to be imbibed in copious draughts all through his education; the collision, combination, harmonizing, of these constitutes speculative insight, and conducts to original thinking. To read the productions of scientific men, to enter into the discussion of abstract themes with kindred minds, to excogitate and to reduce to writing new attempts at generalising from the facts,—such are the exercises of the discursive or scientific mind; and the natural avidity for those exercises is the test of the scientific endowment. Mill laid up in his capacious mind a variety of things; but, with all his getting, he got this special understanding—the understanding of principles. If you wanted, at any time, to commend yourself to his favourable regards, you had but to start a doctrinal discussion—to bring a new *logos* to his view.

With what success he plied his speculative faculty, what were the lines of his peculiar force, how far he rose above or fell below other speculators,—his books alone will testify; and all of them have been freely and almost exhaustively criticized for

those very questions. He is generally admitted to combine originality and clearness as only very few men have done. The attempts to undervalue his reputation on either head have met with little countenance. Tried by an absolute standard, he may be found defective at points; but who is entitled to cast the first stone? What other speculator from the beginning of philosophy has been equally original, and yet more uniformly precise, logical, and intelligible? He could split hairs with any scholastic. He could discern flaws in the closest dialectic; or turn the flank of the most circumspect disputant. Unless I am greatly deceived, time will not impair the fascination of that subtle intellect. The number of men that can handle such weapons can never be so great as to render his writings a superfluity; and, even when his doctrines shall have been more highly worked up, by other thinkers, his manner of putting them will be looked back upon with curious interest.

He himself speaks with not unbecoming pride of his being always open to new views. To the last, he continued (he says) to learn and to unlearn. Of no man can this be stated absolutely. Yet Mill stood very high on the point of receptiveness. He did not shut up his mind to new impressions at forty. This, however, was merely another form of his anxiety to know whatever could be said by any one upon any question. Wishing always to do his very best, he neglected no available means. Before beginning to produce, he took ample time to absorb; and, better than most men, hit the happy mean between haste and procrastination. He might have occasionally improved his work by a little more elaboration, but the loss in quantity would not have been compensated by the difference in quality.

He tells us, in connexion with his readings at Grote's house, that he "dated from these conversations my own real inauguration as an original and independent thinker. It was also through them that I acquired, or very much strengthened, a

mental habit to which I attribute all that I have ever done, or ever shall do, in speculation; that of never accepting half-solutions of difficulties as complete; never abandoning a puzzle, but again and again returning to it until it was cleared up; never allowing obscure corners of a subject to remain unexplored, because they did not appear important; never thinking that I perfectly understood any part of a subject until I understood the whole". This proceeds upon a large assumption, namely, that he always knew when he had attained to a complete solution; which, by the very nature of things, a man can seldom be quite sure of. I consider that he made one great stroke in his theory of the Syllogism; that it was more than a half solution, but yet was not the whole. So, in other things. We are rarely in a position to say that we have finished a problem; a succession of thinkers is required for every great advance; and whoever feels he can make one step need not wait till he can make all the rest. The only reason for hesitation is the uncertainty whether it is a step.

Another somewhat remarkable avowal in Mill's estimate of himself is contained in the long passage (*Autobiography*, p. 242), where he describes the influence of his wife upon his intellectual productiveness. "During the greater part of my literary life I have performed the office in relation to her, which from a rather early period I had considered as the most useful part that I was qualified to take in the domain of thought, that of an interpreter of original thinkers, and mediator between them and the public; for I had always a humble opinion of my own powers as an original thinker, except in abstract science (logic, metaphysics, and the theoretic principles of political economy and politics), but thought myself much superior to most of my contemporaries in willingness and ability to learn from everybody; as I found hardly any one who made such a point of examining what was said in defence of all opinions, however new or however old, in the conviction

that even if they were errors there might be a substratum of truth underneath them, and that in any case the discovery of what it was that made them plausible, would be a benefit to truth." The parenthesis is truly remarkable. A man is to think humbly of himself as an original thinker, provided his originality does not extend beyond Logic, Metaphysics, and Social Philosophy ! How many more subjects would have been necessary to establish the claim ? One would naturally suppose the point to be, how much did he do in these three domains ? If he did everything that many of us are willing to give him credit for, he was an original thinker, and had few superiors, and not many equals. Willingness to learn is a very good thing, and was a part of his merits and a condition of his success ; but it is not under all circumstances necessary to original thinking, and certainly would not of itself constitute originality. Unless there be decided innate force, an oversusceptibility to other people's views rather extinguishes than promotes invention. Had Mill been less disposed to learn and unlearn, he must, with his powers of mind, have been still an original thinker, although in a somewhat different way. He himself contributes a curious and interesting illustration of this very point. To my mind, the best piece of work that he ever did, was the Third Book of the *Logic*—Induction. Now, he tells us how fortunate he was in having finished this Book before reading Comte. That is to say, unassisted invention gave a better result than he would have attained by taking Comte into partnership from the beginning.

I must still farther qualify Mill's claim to receptiveness, by adverting again to what I consider his greatest theoretical errors as a scientific thinker. The first is—his doctrine of the natural equality of men. On this subject he was, in my opinion, blind to a whole region of facts. He inherited the mistake from his father, and could neither learn nor unlearn, in regard to it. The other error was perhaps less to be wondered at ; I mean the disregard of the physical conditions of

our mental life. He might have educated himself out of this error, but he never did. I do not mean to say that he made no allowances for the physical element of our being ; my contention is, that he did not allow what every competent physiologist would now affirm to be the facts. I am afraid that, on both these errors, his feelings operated in giving his mind a bias. Whatever be the explanation, the effect was practically injurious.

In common with his father, Sir Walter Scott, and many others, he held that literature and philosophy should not be resorted to as a means of livelihood ; that people should derive their subsistence from some of the common vocations, and work at the higher themes in leisure hours. In a transition time, when a man of very original views in philosophy, or in sociology, has little chance of being listened to, it would be a mistake to depend for one's livelihood on writing books. The same objection does not apply to literature. Any man whose genius lies in style can make a living with comparative ease ; such a man would not better his condition by serving eight hours a-day in a counting house, and using the few remaining hours for literary work. Much of course depends on the occupation. Mill himself was nominally engaged six hours a-day ; but probably never gave more than the half of that time to his office routine. His two great works—the *Logic* and the *Political Economy*—were, I may say, written during his office hours. If he had been serving under a private master, he would not have been allowed to give up his business-time to extraneous work. Grote took a much better measure of the situation of a business man with erudite tastes. He found that while engaged in the work of the banking-house, he could not only pursue an extensive course of reading, but also work up essays on limited subjects ; yet when he began the Herculean labour of remodelling the entire *History of Greece*, he needed to have his whole time at his disposal, for twelve years.

It was remarked by De Morgan, that if Newton had remained at Cambridge, Mathematical Science might have been advanced a century. So, if the two Mills had been wholly exempted from official work, I have little doubt that all the speculative portions of Logic, Psychology, Politics, and Political Economy would have been put forward at least a generation. It so happened that their official duties opened up for them a sphere of public usefulness, and perhaps made them more practical in their views ; but, if they had been freed from all such labours, which perhaps others could have performed with the benefit of their lights, they would have given an impetus to speculation much beyond what we can now assign to them. By endeavouring to combine work for a livelihood with original research in philosophy, they brought upon themselves premature exhaustion, and vitiated their theories of life by shaping them under the perverting influence of shattered frames.

It is now time to turn to the Moral side of Mill's character. In what has been said on his intellect, moral and emotional elements have been assumed. The general impression made on the world by this part of his character has been highly favourable, on the whole. The generosity of his disposition manifested itself in many forms, and in high degrees ; while it also had its limitations.

The entire total of the emotional aspect of human character comprehends the whole circle of sensibilities, tastes, likings, and the way that those are modified by sympathy and the sense of duty. These are the motives to action, and their relative strength and preponderance can be best judged by action or conduct. Nevertheless, we must, as I conceive, take account of Activity as a separate and independent factor, and form some estimate of it on its account. I said, with reference to James Mill, that Intellect and Will were dominant over Feeling. Perhaps, of the son, we may say that there was a more nearly equal balance of all the three functions. The element of Will,

viewed apart from strength of motives—the pure spontaneous activity—was high in him too ; without that he could not have been such a persistent worker. At the same time, I am disposed to believe that his superabundant energy and activity had its largest source in the strength of his feelings. I once made the remark to him, regarding the sources of energy of character, that these were either natural fulness of vigour, or else excitement through stimulation. He said, quickly—"There : stimulation is what people never sufficiently allow for". It is usually easy enough to determine which of the two sources is operative in any marked case. The extreme dependence on stimulation is shown by the tendency to total quiescence when motives are wanting. Mill no doubt had a good, but not excessive, spontaneity ; and he had very large emotional susceptibilities that made him pre-eminently a worker. We are now to see what these were.

I am not singular in the opinion that in the so-called sensual feelings, he was below average ; that, in fact, he was not a good representative specimen of humanity in respect of these ; and scarcely did justice to them in his theories. He was not an ascetic in any sense ; he desired that every genuine susceptibility to pleasure should be turned to account, so far as it did not interfere with better pleasures ; but he made light of the difficulty of controlling the sexual appetite. He was exceedingly temperate as regarded the table ; there was nothing of the gourmand superadded to his healthy appetite. To have seen his simple breakfast at the India House, and to couple with that his entire abstinence from eating or drinking till his plain dinner at six o'clock,—would be decisive of his moderation in the pleasures of the palate.

Of his pleasures through the ear and the eye, not much can be said, until we take into account all the associated circumstances that render these two senses the avenues of the greater part of our chief gratifications. He had a musical ear, and gave some



attention to music in his early life. His ear for articulate cadence, elocution, and oratory, was in no wise distinguished. His colour-sense was not inconsiderable ; I have heard him say that, as a child, he had a very great pleasure in bright colours. I doubt, however, whether this susceptibility in him could really be called high ; it did not reach the point of the artist or picturesque poet ; if it had, his faculty for the abstract might have been submerged thereby. It was enough to make a perceptible element in his taste for scenery ; but, generally, he seemed to care very little for coloured effects.

We need to dive into the depths of our emotional nature, to reach the main sources of his pleasures and the springs of his conduct. The Tender Feeling must in him have been very considerable. He was, throughout, affectionate, genial, kindly. After his first great physical crisis, when his activity and ambition no longer sufficed for his support, he had recourse to his tender susceptibilities, which had previously perhaps been cramped and confined, although not wholly dormant. He had not the sociable feeling in the form of large indiscriminate outpourings, and boundless capability of fellowship. A certain kindness towards people in general, with a deep attachment to a few, was his peculiar mode ; this, probably, took much less out of him—drew less upon his mental resources as a whole, than the other form of sociability. He formed few close friendships, and was absorbed very early by his one great attachment.

The Tender feeling is necessarily an element in poetry, scenery, history, and indeed Fine Art generally. It is the beginning, but not the consummation, of our interest in mankind—the philanthropic impulse of great benefactors. Kindness to animals was a characteristic form in Mill, as it was in Bentham, who also had a great fund of natural tenderness, although wayward in manifesting it.

There is great difficulty in arriving at the precise degree of the fundamental or elementary emotions in almost any mind, still more in Mill, who, by training or culture, was a

complex product. The remark is applicable to the Tender feeling, viewed in its ultimate form ; and even more to the other great source of human emotion—the Malevolent or Irascible feeling. Unless conspicuously present, or conspicuously absent, the amount of the feeling in the elementary shape can with difficulty be estimated in a character notable for growth, and for complication of impulses. In Mill, all the coarse, crude forms of angry passion were entirely wanting. He never got into a rage. His pleasures of malevolence, so far as existing, were of a very refined nature. Only in the punishment of offenders against his fellow-men, did he indulge revengeful sentiment. He could, on occasions, be very severe in his judgments and denunciations ; but vulgar calumny, abuse, hatred for the mere sake of hatred, were completely crucified in him. He spent a large part of his life in polemics ; and his treatment of opponents was a model of the ethics of controversy. The delight in victory was with him a genial, hearty chuckle, and no more.

Taking emotional and sensuous elements together, we may recount his chief tastes and diversions, irrespective of sympathy proper, which adds a new and all-important fact of character.

The love of scenery, in connexion with touring excursions, was stimulated from an early date, and indulged in to the last. Whether he had a refined judgment of scenic effects, from an artist's point of view, I am unable to say. He did not become poetically inspired by nature, like Shelley or Wordsworth ; perhaps he enjoyed it none the less. He made little use of his varied travels by allusions, or figures in his composition. His enjoyment of the concrete did not render his style much less abstract than it would have been although, like Kant, he had never left home.

His taste for plant-collecting began in France, under George Bentham, and was continued through life. It served him in those limited excursions, in the neighbourhood of London, that he habitually kept up for the needs of recreation. I may be mistaken, but it seems to me, that this taste belongs to a

character joyous by nature, and therefore easily amused; or perhaps nothing more stimulating is to be had. It no doubt adds an interest to pedestrian exercise. The mental effort is very small; the scientific outcome still smaller. Of Botany as a science, Mill knew very little; indeed, when he began, there was not much to be known, beyond the description of plants in detail, and the classifications of Linnaeus and Jussieu. Plant-hunting was to him what sports are to other persons. I doubt whether, under any circumstances, he could have brought himself to be a sportsman. Hunting and shooting would, I am pretty certain, have been abhorrent to him; and, while his excursions often brought him into opportunities for fishing, he never availed himself of these. The chase for plants was all that he desired. In my chapter, in *The Emotions and the Will*, on Plot-Interest, I endeavoured to describe the situation of pursuit in the sports of the field. When Mill revised the MS. of the work, before publication, he added the note, which is given in connexion with the passage—"All this eminently applies to the botanist".

Reverting to his interest in natural scenery, we may recall his great anxiety lest the enclosure of Commons should go the length of effacing natural beauties and diminishing the scope of the picturesque tourist. This was one of the "live points" of his charter in reforming the Land Laws. He was also very much concerned (and so was his father) at the possible havoc that the railways might make in the beauties of our rural districts. Thus, writing in 1836, on the measures of Reform then pending, he adverts to the progress of the railways, and observes—"it is far from desirable that this island, the most beautiful portion perhaps of the earth's surface for its size, should be levelled and torn up in a hundred unnecessary directions by these deformities". And again:—"In the choice of a line it is disgraceful that not one thought should be bestowed upon the character of the natural scenery which is threatened with destruction. It is highly desirable that there

should be a railway to Brighton ; scarcely any one which could be constructed would be convenient to such a multitude of persons, or is likely to be so profitable to the subscribers. But of the five rival lines which have been proposed, two, if not three, and particularly Stephenson's, would, to a great degree, annihilate the peculiar beauty of a spot unrivalled in the world for the exquisiteness, combined with the accessibility, of its natural scenery : the vale of Norbury, at the foot of Box Hill. Yet into the head of hardly one Member of Parliament does it appear to have come, that this consideration ought to weigh one feather, even on the question of preference among a variety of lines, in other respects probably about equal in their advantages. Yet these men have voted £11,000 of the people's money for two Correggios, and many thousands more for a building to put them in, and will hold forth by the hour about encouraging the fine arts, and refining the minds of the people by the pleasures of imagination. We see, by this contrast, what amount of real taste, real wish to cultivate in the people the capacity of enjoying beauty, or real capacity for enjoying it themselves, is concerned in this profuse expenditure of public money ; although two-thirds of these men would shout in chorus against 'political economists' and 'utilitarians' for having no imagination, and despising that faculty in others. The truth is, that in this country the sense of beauty, as a national characteristic, scarcely exists. What is mistaken for it is the taste for costliness, and for whatever has a costly appearance."

The passage is a long one ; but it illustrates Mill in other points besides his love of scenery. I cannot help thinking that his sweeping condemnation of Members of Parliament generally is a little overdone.

One other anecdote is worth preserving. A number of years ago, Piccadilly was widened by taking a slice off the Green Park. A row of trees was included in the addition ; and, in all probability, these would have been cut down. Lord Lincoln

was then chief Commissioner of Woods and Forests. Mill intervened at the right moment, and, I believe by the mediation of Charles Buller, induced Lord Lincoln to preserve the row as they now remain at the street edge of the foot pavement.

Setting aside for the moment the interests that grew out of his intellectual capabilities and work generally, we may remark upon his æsthetic sensibilities as a whole. His earliest favourite books were those relating to characters renowned for heroism and strength. I do not think that this persisted through life to a marked degree. He qualified his admiration of strength with the use made of it; and thoroughly concurred in Grote's estimate of Alexander the Great. Cæsarism was his abomination. Pericles, I should suppose, was his greatest hero of antiquity. Greece was the home of his affections in the ancient world.

His poetic tastes, as they revealed themselves after his great crisis, are beyond my powers to analyze or explain. Soon after I knew him, he endeavoured to make me interested in Wordsworth, and pointed out the poems that I should begin with; but his efforts were for the time unsuccessful. He seemed to look upon Poetry as a Religion, or rather as Religion and Philosophy in one. He took strongly to Tennyson, and was able to discern at once those beauties that the general world have since agreed upon; but his obtuseness to Shakespeare would suggest doubts as to his feeling for poetic effects of the kind that represent pure poetry, apart from either religion or philosophy. I never could make sure whether the highest genius of style attracted him, without pointing some moral, or lending itself to a truth; yet, I found from one of his letters at a late period of his life, that he continued to read Carlyle with pleasure, after ceasing to care anything for his doctrinal views. His thorough mastery of the French language enabled him to enjoy the masterpieces of French prose. At an early stage, he read the French wits for improving his style; and it has seemed to me a curious slip of memory that he never mentions, in the *Autobiography*, Paul

Louis Courier, whose witty turns he often quoted with gusto. He was charmed with George Sand, as a matter of course ; and the rhetoric of Victor Hugo was not strong for him. Yet his doctrinal leanings came out even with the French romancists. I can remember going with him to Baillière's shop in Regent Street, after the publication of the *Political Economy*, to direct copies to be sent to Eugène Sue and George Sand ; his reason being, that their novels were impregnated with social theories ; and these he partly sympathised with, and partly desired to rectify.

We cannot proceed farther without including the Sympathetic element in character, which should be viewed apart from mere emotion ; it being so easily confounded with tender feeling. There is in every one a certain strength of the sympathetic disposition, and a certain limited number of channels wherein it flows. What actually comes to the surface is a result of the conflict between the natural force of sympathy (a hypothetical quantity) and the purely egotistic impulses. Now there is no doubt that Mill had a highly sympathetic nature, but it had very decided limits. It must have operated at once as a restraint on the growth of egotism, a quality very little pronounced in his character. Placed early in life in an occupation which soon gave him comparative opulence, he was rendered content as far as regarded means, and thus removed from the struggle for subsistence. He had made up his mind that his writings would not bring him money, and for a time not even fame ; so that he was more than satisfied with his success as an author. He was absolutely without any feeling of rivalry, or jealousy of other men's success. His originality and fecundity of ideas would not have exempted him so completely from the dread of being anticipated in his discoveries, or baulked of his credit, had he not possessed a fund of generosity of character, for which sympathy is another name. He poured himself out in conversation, and his ideas were caught up and used, with

or without acknowledgment ; but he never disturbed himself one way or other. Of this part of his character, I can speak absolutely, and not by a figure of speech, under which we may turn a part into a whole. In other virtues, he had his limits, but in this he had none.

What was the extent of his generosity in money gifts and assistance, I cannot tell. It may have been considerable, but would never have been known from himself ; the Comte correspondence tells us what he was prepared to do for Comte, at the worst conceivable moment for his own circumstances. But cases are known where he came to the relief of authors in their difficulties with publishers. I have heard him say generally that he considered it a very good way of helping a young author, to offer to bear the risk of the publisher's loss, in the first instance. Mr. Herbert Spencer mentions an offer of this kind made to him, at a time when he was on the eve of suspending the publication in numbers of his great serial work. He did something of the same kind for me, when Parker wished to delay publishing my volume - *The Emotions and the Will*. On condition of immediate publication, he offered a guarantee against loss, which had the effect without being called into play.

Another point of conduct where his merits were absolute, had reference to fidelity in engagements, punctuality, and thorough reliableness, when he pledged his word. He never, to my knowledge, failed in any matter where people counted on him. I remember his having an important communication to make, by a given day, to the Women's Suffrage Committee. To obviate the possibility of miscarriage, he despatched a duplicate by a different channel.

Continuing our criticism\* of the generous or altruistic side of Mill's nature, we may single out his treatment of opponents in his life-long controversial warfare. There are very few cases indeed, where he failed to put forward the whole strength of the arguments that he was contending against ; and his manner

with irritating controversialists is exactly stated in the preface to his Discussions, thus—

“Only a small number of these papers are controversial, and in but two [the Sedgwick and Whewell articles] am I aware of anything like asperity of tone. In both these cases some degree of it was justifiable, as I was defending maligned doctrines or individuals, against unmerited onslaughts by persons who, on the evidence afforded by themselves, were in no respect entitled to sit in judgment on them: and the same misrepresentations have been and still are so incessantly reiterated by a crowd of writers, that emphatic protests against them are as needful now as when the papers in question were first written. My adversaries, too, were men not themselves remarkable for mild treatment of opponents, and quite capable of holding their own in any form of reviewing or pamphleteering polemics. I believe that I have in no case fought with other than fair weapons, and any strong expressions which I have used were extorted from me by my subject, not prompted by the smallest feeling of personal ill-will towards my antagonists.”

We must emphatically claim for him the merit of being, throughout his whole life, a seeker for truth. To be found in error was no affront to his *amour propre*. He was not afraid to encounter an able opponent; simply because to change an opinion, under the force of new facts or reasonings, was not only not repugnant, it was welcome. His opinions were in marked opposition to his worldly interests, as his father's had been. He did not publicly avow his dissent from the orthodoxy of the country; but it was well enough known in a very wide private circle, and could be inferred from his published writings. He had long determined to throw off the mask entirely, when the time should be ripe for it. He intended, he said, to expend all the reputation he got by his books in upholding unpopular opinions; and was prevented from an earlier avowal of these, solely by the circumstance that the silent course of opinion was serving



the interests of progress better than any violent shock, on his part would have done. Courage was a quality he was never deficient in; the reason being that he was ready to incur the sacrifice that it necessarily involves. Perhaps, with one exception, the most signal example of his courage was the composition of the Essay on *Theism*. It was a more extraordinary revelation of departure from opinions that he had been known to maintain, than had been his Bentham and Coleridge articles; and, while it might be grateful to some of his friends and the opposite to others, it was certainly hard to reconcile with his former self.

These aspects of his character properly connect themselves with the great central peculiarity of an ardent public spirit, contracted under his father's influence and fostered by his own natural dispositions. He is admitted on all hands to have had a pure and genuine love of his kind. It was the key to his life-long exertions; and had the very minimum of intermixture with purely personal ambition. He cordially sympathized with every form of improvement; and did whatever lay in him to aid the contrivers of new and beneficial schemes. He was a strong supporter of Mr. Chadwick's Poor Law and Sanitary legislation. He was quite exultant when the Peel Government of 1841 acquiesced in the Penny Postage, which Peel had at first opposed. He gave a willing hand to any plausible projects of improvement. His taking up of Hare's scheme of representation was a notable illustration of his readiness to embrace proposals that he had no hand in suggesting. If anything, he was perhaps too eager and hopeful, and prone to be led away by fair promises; his natural temperament was confiding rather than sceptical; when he had not knowledge enough to check what other people said, he was ready to take them at their word.

It is, then, to his zeal for the welfare of mankind, that we must refer the direction of his pursuits and the intensity of his

labours. He knew what his own capabilities were, and placed them freely at the service of his fellow-beings, according to his best lights. His tastes, pleasures, or likings, must now be reviewed, with the addition of the sympathetic or altruistic element. We must add, to the points already named, the active portion of his character—the delight in the exertion of his faculties, and in the prospect of public good accruing therefrom. He had, to begin with, a pleasure, of quite unusual amount, in the putting forth of his speculative powers, both in conversation and in writing. Considering the high standard of excellence he had achieved, not simply in the invention, but also in the expression and elaboration, of his ideas, I am astonished at his avowals of sustained pleasure in writing. He used to say that the beginning of a work cost him a good deal of labour and pain ; but when he was fairly launched, his enjoyment of the task predominated over the toil. His severe early training perhaps contributed to this rare and enviable endowment. He, more than once, to my recollection, after two or three months’ touring in summer, retired to Avignon, to have a *holiday of work* ; namely, to write a book.

Such was the egoistic side of his work, and was of course somewhat strongly expressed. To account fully for his many labours, we must also view the altruistic side. This was the fixed idea that he came into the world not to serve himself, but to serve his race ; and that idleness, except as the condition of renewed labour, was culpable and base. His favourite text was—The night cometh when no man can work. Here is an interesting remark in a letter to Thornton, in 1860. Thornton had been to see Oxford, and Mill recalls his own visit twenty years before, and says—“In that same holiday I completed the first draft of my *Logic*, and had, for the first time, the feeling that I had now actually accomplished something—that one certain portion of my life’s work was done”. I understand that, on the night of his death, when he was informed that he would not recover, he calmly said—“My work is done”.

Although his services to the public were spread over his life, in alternation with tracts of recreation and pure enjoyment, and although they were, to an unusual degree, pleasurable in the performance, yet I do not doubt that he could, if necessary, have given still greater proofs of his disinterestedness and zeal for humanity. He could have embraced a much more self-denying career; like Howard, in Bentham's felicitous eulogy, he might have "died a martyr, after having lived an apostle".

I must now endeavour to point out what were the more conspicuous shortcomings of the generous or sympathetic side of Mill's nature. Everyone's sympathies come to a stop somewhere; and a character is not completely stated without assigning the limit. I am not speaking of the case where antagonism is a necessary consequence of attachment; we must be enemies to those that make enemies of us. I allude to cases where I believe Mill's sentiments may be fairly considered as excessive and uncalled for. Had his judgment of the circumstances been perfect, the severity might have been right; but he at times assumed too readily his own infallibility, and condemned people accordingly. In the *Autobiography*, he recants the harshness of his judgment upon the radical leaders of the years following the Reform Bill; yet he does not apologize for such language as the following. I quote from the *Life of Fonblanque*:—

"In 1838 these differences [among the Radicals] appear to have become more serious; and we find Fonblanque reproaching Mill with identifying himself with the "Grote conclave" and the "philosophical Radicals," and Mill, in defending himself against the charge, repudiating the doctrines of Grote and his coterie, as "persons, whom I have nothing to do with, and to whose opinions you are far more nearly allied than I am. . . . There may be such a conclave, but I know nothing of it, for I have never been within the door of Grote's house in Eccleston Street, and have been for the last few years

completely estranged from that household. Immediately after Lord J. Russell's declaration I tried to rouse them, and went to a meeting of most of the leading parliamentary Radicals at Molesworth's, from which I came away, they thinking me, I fancy, almost mad, and I thinking them craven. I do not except Grote, or Warburton, or Hume, all of whom were there. I except none but Molesworth and Leader, two raw boys; and I assure you, when I told them what I thought should be done by men of spirit and real practicalness of character, I had perfect ground for feeling well assured that they would not do it."

I think his habitual way of speaking of England, the English people, English society, as compared with other nations, was positively unjust, and served no good end. This remark occurs in the article on *The Claims of Labour*. "It is a just charge against the English nation, considered generally, that they do not know how to be kind, courteous, and considerate of the feelings of others. It is their character throughout Europe. They have much to learn from other nations in the arts not only of being serviceable and amiable with grace, but of being so at all." Now, it seems to me, that, with the standard of moral perfection in our view, a great deal may be said against our country; but, in the comparison with France, Germany, Italy, Spain, and the rest, I cannot admit the justice of such a strain of remark. Mill had a great partiality for France, until the usurpation of Louis Napoleon; and his opinion of England was correspondingly low. His criticism of public men and public events seemed to me to err very often on the side of severity. His denunciation of our age in particular, as compared with former ages—"this is an age of weak convictions, &c."—is, I think, considerably misplaced, and savours too much of Carlyle. There may have been ages with more intensity in special directions—as religious fervour, for example—but I doubt if any century ever took upon itself the redress of so many wrongs, left untouched for ages, as ours has done.

His remarks (*Autobiography*, p. 227) as to his withdrawal from general society, at the close of the political decade, 1830-40, have naturally exposed him to pretty sharp criticism. "General society, as now carried on in England, is so insipid an affair, even to the persons who make it what it is, that it is kept up for any reason rather than the pleasure it affords"; and so on. It is difficult to recognize the appositeness of the censure. General society is a very large phrase; it comprises coteries where such a man as Mill would be out of his element, and others where he might discuss any subject, and utter any opinions that he pleased. It was no doubt a saving of time to renounce going into society; but it was accompanied with some loss, for which he makes no allowance. There were other societies, besides the Political Economy Club, where he could have occasionally gone with considerable profit. Before hazarding all the opinions contained in the *Essays on Religion*, he would have done well to have discussed them with a variety of persons whom it would not be difficult to name.

In expressing himself on matters that he very much disliked, he was at times exceedingly sharp and plain-spoken. One example is given by Mr. Holyoake, in connexion with the population question. In other cases, I have known him very unceremonious in his expressions of disapproval. I never had any occasion to complain of his manner, so far as I myself was concerned; he was, on the contrary, unremittingly courteous as well as kind. But the things that he said to other people, made one feel that he might take a sudden and inexplicable turn. Then, it was a theory of his to be more frank and outspoken than the common notions of good-breeding would allow; with this qualification, that he expected to be treated to the same frankness in return. We must carefully exonerate him from rudeness of language; his refinement and tact were perfect; he could clothe a very severe remark in an unexceptionable form. For many years, he was wont to encourage young men to send him their productions for criticism and

advice. He took a great deal of trouble in recommending such articles to editors; and thus helped to start not a few men in a literary career. It was, I think, G. H. Lewes that mentioned sending something to him, as he had often done before; the paper was abruptly returned without explanation.

It will no doubt go down to posterity as one of his characteristic traits, that he refused to see our two Royal Princesses (the Crown Princess of Prussia and the Princess Alice), who earnestly sought an interview, and proposed to go to Avignon for the purpose. We cannot attribute the refusal to haughtiness or pride, which was entirely foreign to him; but, in the absence of the real explanation, I prefer to give no opinion on what would seem an uncalled-for discourtesy.

I am bound to take notice of what he calls the greatest friendship of his life; his relation to Mrs. Taylor, which began in 1831, and led to his marrying her, twenty years later, when her first husband was dead.

When I went to London in 1842, the friendship had lasted eleven years. It was the familiar talk of all the circle. On his first acquaintance with Mrs. Taylor, he introduced her to some of his friends, but chiefly, I think, to Carlyle, whom she continued to visit for a considerable time, being, as we are told, one of his great admirers. Mill and she attended together Carlyle's courses of Lectures.

The connexion soon became known to his father, who taxed him with being in love with another man's wife. He replied, he had no other feeling towards her, than he would have towards an equally able man. The answer was unsatisfactory, but final. His father could do no more, but he expressed to several of his friends, his strong disapproval of the affair. Some attempts at remonstrance were made by others, but with no better result. Nothing, it was said, drew down his resentment more surely than any interference, or any remarks that came to his ear, on the subject. When I first knew him, he

was completely alienated from Mrs. Grote, while keeping up his intercourse with Grote himself; and as she was not the person to have an opinion without freely expressing it, I inferred that the estrangement had some reference to Mrs. Taylor. Mrs. Austin, too, I was told, came in for the cold shoulder; and Harriet Martineau, who had special opportunities of knowing the history of the connexion, and also spoke her mind freely concerning it, was understood to be still more decisively under the ban.\*

The upshot was that everyone of Mill's friends abstained from all allusions to Mrs. Taylor, and he was equally reticent on his side. Her name was never mentioned in his own family. His manner of intercourse with her is stated generally in the *Autobiography*, p. 229. In the summer of 1842, and for some of the following summers, I cannot say how many, I knew that he went to dine with her at her husband's house, in Kent Terrace, Regent's Park, about twice a-week (Mr. Taylor himself dining out); there were certain days that he was not available for a walk with me from the India House to Kensington. Occasionally, I happened to fall upon one of these days, and we went together only as far as the Bank, where he took the omnibus for the Regent's Park. At a later period, she was living mostly in the country, in a lodging (I think at Walthamstow) with her daughter, then very young. I believe that, at this time, she was suffering from spinal injury, and had to remain on the sofa for several years. She ultimately recovered the power of walking, but was delicate in other ways, being liable to attacks

\* Miss Martineau was present at the dinner party, in Mr. Taylor's house, in the city, at which Mill first met his wife. She related freely the whole of the circumstances, but I see no good in repeating them. Mr. Taylor was a member of the Unitarian body, and attended the chapel of W. J. Fox. Mrs. Taylor made Fox her confidant as to her want of sympathy from her husband (to whom she had been married at 18), and Fox suggested her becoming acquainted with Mill. Fox was one of the dinner-party. Roebuck also was present.

Mr. Taylor was, I understand, a Druggist, or Wholesale Druggist, in Mark Lane; his eldest son still carries on the business.

of hemorrhage from the lungs. During all the years of her marriage with Mill, she was properly described as an invalid.

The behaviour of her husband was, in the circumstances, exceedingly generous. After some remonstrances and explanations, he accepted the situation ; a *modus vivendi*, as the phrase is, was agreed upon ; and he was a consenting party to the intercourse that Mill describes. No doubt he and his children were sufferers by the diversion of his wife's thoughts and attentions ; to what extent I will not presume to say.\*

The first occasion when Mill gave publicity to his admiration for Mrs. Taylor was in bringing out his Political Economy. In a certain number of copies, stamped "Gift copies," he introduced a dedication, in the following terms, as near as I can remember :—"To Mrs. John Taylor, who, of all persons known

\* A Divorce law, such as exists in Germany, and in some of the United States of America, would have been the best thing for all parties in this anomalous situation. Mill repeatedly exposed the weakness of the common arguments for indissoluble marriage, yet never advocated divorce under any conditions. Mr. Morley details a conversation with him, not long before his death, during which he touched upon this question, and said he would not have it raised until women had an equal voice with men in deciding it. I am afraid if it can lie over till that time, it will lie over a good while longer.

Bentham argues the question with his usual incisiveness ; and his arguments are rarely met. An attempt, on the part of Whewell, to meet them, is thus disposed of by Mill himself :—

"Finally, Dr. Whewell says—'No good rule can be established on this subject without regarding the marriage union in a moral point of view ; without assuming it as one great object of the law to elevate and purify men's idea of marriage : to lead them to look upon it as an entire union of interests and feelings, enjoyments and hopes, between the two parties'. We cannot agree in the doctrine that it should be an object of the law to 'lead men to look upon' marriage as being what it is not. Neither Bentham nor any one who thinks with him would deny that this entire union is the completest ideal of marriage ; but it is bad philosophy to speak of a relation as if it always *was* the best thing that it possibly can be, and then infer that when it is notoriously not such, as in an immense majority of cases, and even when it is the extreme contrary, as in a considerable minority, it should nevertheless be treated exactly as if the fact corresponded with the theory. The liberty of divorce is contended for, because marriages are not what Dr. Whewell says they should be looked upon as being ; because a choice made by an inexperienced person, and not allowed to be corrected, cannot, except by a happy accident, realise the conditions essential to this complete union."



to the author, is the most highly qualified, either to originate or to appreciate speculation on social advancement, this work is, with the highest respect and esteem, dedicated." He tells us that he wished to prefix this dedication to the published copies, but she disliked it.

Although, like everybody else, I had always avoided any allusion to Mrs. Taylor, I thought that he had now, of his own accord, introduced her name to his friends, and that to continue ignoring her existence was mistaken delicacy. I accordingly did venture to speak of her, and drew him out into a eulogy of her extraordinary powers. The phrase that chiefly survives in my memory is—she was an "apostle of progress". He spoke with great vehemence, and seemed not at all to dislike my broaching the subject. I believe no one else made the same use of the occasion; and I was considered to have done a very rash thing. I confess, I did not feel disposed to renew the reference very often: I alluded to her again only two or three times, and not till after their marriage. He asked no one, so far as I know, to visit her. Grote would have most cordially paid his respects to her, had he known it would have been agreeable; but he did not receive any intimation to that effect, and never saw her either before or after her marriage to Mill. Mrs. Grote had, on one occasion, at Mill's desire, taken her to the House of Commons to hear Grote speak.

Her two sons were friends of Mill's mother and family. I have repeatedly met them at the house. George Mill used to visit at their father's house, and knew their mother well. Of course, he often spoke of her to his companions, myself among the rest. Although a young man, he was not incapable of forming a judgment of people; and his observation always was, that Mrs. Taylor was a clever and remarkable woman, but nothing like what John took her to be.\*

\* Mill for a time (I suppose during the thirties) went to the receptions of Lady Harriet Baring, afterwards the first Lady Ashburton, whom he was said

He did not again, in her lifetime, bring her name prominently forward. It was after her death that he made her the subject of his extraordinary encomiums. The first occasion was in the dedication to the *Liberty*; this was followed, soon after, by the note in the second volume of the *Dissertations*, in connexion with her own article on the *Enfranchisement of Women*. Grote used to say—"only John Mill's reputation could survive such displays". Finally, came the *Autobiography*.\*

The love attachment between the sexes, in its extreme instances, is hardly reducible to any of the laws of human feeling in general. Its occasions and causes seem often out of all proportion to the effects. On what seems a very minute physical feature often turns an overpowering preference for one individual, a fascination stronger than anything that life affords. The description given by Heine is a typical instance:—"Her voice was delightful to me beyond all that I had ever heard. Yes: or have since heard; or ever shall hear." The effects of personal beauty upon human beings generally are far from being accounted for; the special likings for individuals are still less explicable. A few circumstances have been noticed as more or less prevailing in their sweep. The influence of contrasted peculiarities is perhaps the most notable; the liking of fair for dark complexions is very

to admire very much. He was introduced, I believe, by Charles Buller, a great favourite with her ladyship, herself remarkable for wit and brilliancy. He broke off this connexion abruptly; various reasons were afloat. Of course, Mrs. Taylor's name came up in the explanation.

\* The inscription on the tomb at Avignon is worded thus:—"Her great and loving heart, her noble soul, her clear, powerful, original, and comprehensive intellect, made her the guide and support, the instructor in wisdom, and the example in goodness, as she was the sole earthly delight of those who had the happiness to belong to her. As earnest for all public good as she was generous and devoted to all who surrounded her, her influence has been felt in many of the greatest improvements of the age, and will be in those still to come. Were there even a few hearts and intellects like hers, this earth would already become the hoped-for heaven." The wordiness of the composition is more suggestive of intense feeling than a polished elegy could have been.

apparent in mixed races like ourselves. In mental peculiarities, contrast also dominates in many subtle forms which I need not here dilate upon.

Mill would fain make us believe that the attachment in his case was based altogether on mental superiority—intellectual and moral. The influence of beauty in general, the special attraction of fair for dark, of tall for short, and other such influences,—he would have us leave entirely out of the account. Hard thinkers are most often charmed, not by other thinkers, but by minds of the more concrete and artistic mould. He would have perhaps allowed something of this sort, in his case, with the condition, that the artistic element was merely one of the aspects of a genius that took the first rank in every form of intellectual greatness.

The influence of contrast in producing the love of attachment must be so expressed as not to exclude sympathy or agreement in opinions, objects, and aspirations; which is one great cause of individual likings. This is a broad general fact, but does not go far towards explaining the select overpowering attachments. Mill tells us that his opinions on the complete equality between the sexes in all legal, political, social, and domestic relations were, he believed, more than anything else, the originating cause of the interest his wife felt in him. This is so far in conformity with the general principle; yet does not help us very much.

His hyperbolic language of unbounded laudation, which has been the cause of so much wonderment, can be somewhat checked by the details that he himself supplies. His accustomed precision does not desert him in regard to these; and we are enabled to form a probable estimate of what his wife really was to him.

In the first place, he tells us that the *Logic* owed nothing to her, except the minutiae of composition. Then as to the *Political Economy*, the purely scientific part he did not learn from her. What was entirely her work was the chapter en-

titled, "The Probable Future of the Labouring Classes," which, he says, has had a greater influence on opinion than all the rest put together. It was "chiefly her influence that gave the book that general tone by which it is distinguished from all previous expositions of Political Economy that had any pretensions to be scientific, and which has made it so useful in conciliating minds which these previous expositions had repelled". Again: "What was abstract and purely scientific was generally mine; the properly human element came from her; in all that concerned the application of philosophy to the exigencies of human society and progress, I was her pupil, alike in boldness of speculation and cautiousness of practical judgment".\*

He avows an intensity of passionate regard that could hardly subsist in any mind, without yielding the known consequences of excessive emotion. Difficult as it often is to bring under general laws of the mind the capricious origin of strong attachments, there is much more of law and uniformity in the results. If one particular attachment of the mind is twenty times as strong as the strongest of the others, and ten times as strong as all the rest of the regards put together, the effects may be calculated to a certainty. The minor feelings will receive their limited share of consideration; only, they must never enter into rivalry with the master passion; they may be easily put aside altogether for a time. Mill, in writing to his brother James, after his bereavement, says:—"When I was happy, I never went after any one; those that wanted me might come to me". After his grief had subsided, he began to seek his friends; he went to their houses, and received them

\* Carlyle, when led to refer to Mrs. Taylor, used to describe her in his own way. The phrase that he most usually employed was, I think, "veeviid"; which the reader may compare with the terms that he used in his supercilious mood when he penned the "Reminiscences". John Mill himself, in what he said to me about her, noted specially her great power of seizing and retaining pictorial or concrete aspects; indicating that she had the groundwork of an imaginative intellect.

into his ; and was in his last years, for a few months in the twelve, a sociable man.

The chapter above referred to, as I understand it, is occupied with an account of the altered position of the working classes with reference to those above, as no longer a relation of dependence and protection. "We have entered into a state of civilisation in which the bond that attaches human beings to one another, must be disinterested admiration and sympathy for personal qualities, or gratitude for unselfish services, and not the emotions of protectors towards dependents, or of dependents towards protectors. The arrangements of society are now such that no man or woman who either possesses or is able to earn a livelihood requires any other protection than that of the law. This being the case, it argues great ignorance of human nature to continue taking for granted that relations founded on protection must always subsist, and not to see that the assumption of the part of protector, and of the power which belongs to it, without any of the necessities which justify it, must engender feelings opposite to loyalty." This is the same thesis so well worked out in the article on *Claims of Labour*. The third paragraph contains an emphatic assertion of the necessity of opening up industrial occupation freely to both sexes. The second half of the chapter discusses Co-operation, as a means of raising the condition of the labourer.

All this might certainly have grown out of Mill's own independent studies ; but we must take his word for it when he says that his conversations with Mrs. Taylor helped him in giving it "form and pressure".

He makes no special claim for her in regard to his Political writings ; of which the *Representative Government* (composed soon after her death) may be considered as the sum. He mentions merely that she preceded him in turning against the Ballot.

The *Liberty* was the chief production of his married life : and in it, she bore a considerable part. His own antecedents

had prepared him for writing a defence of Free-thought that would be sure to take rank with the first expositions of the subject. The book has unsurpassed excellencies, and, as I think, some defects. How far these are to be partitioned between the two co-operating minds, there is probably no means of discovering.

The *Subjection of Woman* is said to have been the result of their joint discussions for many years; Miss Helen Taylor assisting in the composition. No doubt this was his wife's subject by pre-eminence; it is the only subject that she actually wrote upon with her own pen. Her influence upon Mill, and upon the world through him, lay unmistakably here. Apart from her, he probably might have continued to hold his original opinions as to the equality of the sexes, but he might not have devoted so much of his life to the energetic advocacy of them.

If Mill had been content with putting forward these explanations as to his wife's concurrence in his labours, the world would have accepted them as given, and would have accorded to her a reputation corresponding. Unfortunately for both, he outraged all reasonable credibility in describing her matchless genius, without being able to supply any corroborating testimony. Such a state of subjection to the will of another, as he candidly avows, and glories in, cannot be received as a right state of things. It violates our sense of due proportion, in the relationship of human beings. Still, it is but the natural outcome of his extraordinary hallucination as to the personal qualities of his wife. The influence of overweening passion is most conspicuous and irrefragable in this particular. He does not tell us that he set aside other interests on her account; what he does tell shows that his mode of estimating her must have been partial to a degree that will create lasting astonishment. The remark was made by Mr. Goldwin Smith, that Mill's hallucination as to his wife's genius deprived him of all authority wherever that came in; but he was still to be treated with the deference due to his great powers, where that did not

come in. It is fortunate for his fame and influence, that so very much of what he did was entirely withdrawn from possible bias on her account.

It is a painful fact that his marriage was the occasion of his utter estrangement from his mother and sisters. He had been the joy and the light of the house, while he lived with the family.\* Some very slight incident was laid hold of as a ground of offence, and all communication was thenceforth broken off, excepting on essential matters of business. But for the redeeming circumstance of his coming forward, with his natural generosity, when misfortune arose, the relations with his own family after his marriage would have seriously shaded his biography. I speak, of course, from one-sided knowledge, which is never held conclusive; but all parties concerned have been under powerful motives to put the best possible construction upon his conduct.

Various views have been given as to the nature of the fascination that first drew him to Mrs. Taylor. One view is simply that he fell, as philosopher and peasant alike may fall, under the witchery of the other sex. To complete the explanation, it is added, that his severe intellectual strain prepared him for a reaction on the emotional side, and that the grand passion came in happily to fill up an aching void in his nature. His finding one that could be an intellectual companion entered into the charm.

Now this may be all very true, but we do not know it to be the truth. The fact must be faced that, on his own showing, she was an intellectual companion, only in a very small portion of his range of studies. He had no sympathy or help from her during perhaps the most intense and exciting work that he ever went through—the composition of the *Logic*. Their great mutual sympathy grew up on her strong practical views on a certain limited number of topics, on which he grew more and more ardent, and magnified at the expense of his whole speculative range in *Logic*, *Metaphysics*, and *Politics*.

The more common way of representing Mrs. Mill's ascendancy, is to say that she imbibed all his views, and gave them back in her own form, by which he was flattered and pleased. This is merest conjecture: the authors of the surmise never saw Mill and his wife together; and, in all probability, misconceived the whole situation. As I have just remarked, it was comparatively few of his ideas that she could render back in an intelligent form. But farther, it is not the true account of Mill to say that he was pleased by the simple giving back of his own thoughts. Of course, this would have been preferable to contradicting him at every point, or to gross misconception of his meaning. Judging from my own experience of him, I should say that what he liked was to have his own faculties set in motion, so as to evolve new thoughts and new aspects of old thoughts. This might be done better by intelligently controverting his views than by merely reproducing them in different language. And I have no doubt that his wife did operate upon him in this very form. But the ways of inducing him to exert his powers in talk, which was a standing pleasure of his life, cannot be summed up under either agreement or opposition. It supposed independent resources on the part of his fellow-talker, and a good mutual understanding as to the proper conditions of the problem at issue.

Mill was not such an egotist as to be captivated by the echo of his own opinions. Something of the kind might have applied to Milton, if he had been fortunate enough to find a suitable mate; or to the affection of Auguste Comte for Clotilde de Vaux. The men that Mill professed most attachment to were very much at variance with him even in fundamental questions. It is enough to refer to what he says of John Sterling, who retained to the last the *à priori* way of looking at things. I saw him and Sterling together, once or twice, and could easily divine the cause of their mutual liking. Sterling is known from Carlyle's portrait of him: he was exceedingly genial in disposition and manner, and overflowed in suggestive



talk, which Mill took up and improved upon in his own way. In like manner, one of Mill's chief friendships in later years, was with Thornton, who differed from him in a great many things, but the differences were of the kind to bring into lively exercise Mill's argumentative powers.

My next topic in the delineation of Mill's character, is his **STYLE**. He is allowed to be not only a great thinker, but a good writer. His lucidity, in particular, is regarded as pre-eminent. Exceptions are taken by the more fastidious critics; he is said by Mr. Pattison to be wanting in classical grace and literary polish.

I have already expressed the opinion that the language faculty in him was merely ordinary. Great cultivation had given him a good command of expression for all his purposes, but nothing could have made him a Macaulay. To begin with his vocabulary—including in that, not simply the words of the English dictionary, but the stock of phrases coined by our literary predecessors for expressing single ideas—we cannot say that in this he was more than a good average among men of intelligence and culture. He was greatly inferior to Bentham in the copiousness, the variety of his primary stock of language elements. He was surpassed, if I mistake not, by both the Austins, by Grote and by Roebuck. Had he been required to express the same idea in ten different forms, all good, he would have come to a standstill sooner than any of those.

His grammar is oftener defective than we should expect in any one so carefully disciplined as he was from the first. In some of the points that would be deemed objectionable, he probably had theories of his own. His placing of the troublesome words "only" and "not only" is, in my judgment, often wholly indefensible. Scores of examples of such constructions as the following, may be produced from his writings:—"Astræa must *not only* have returned to earth, but the heart of the worst

man must have become her temple." "He lived to see almost all the great principles which he had advocated *not merely* recognised, but a commencement made in carrying them into practice." "It is *not* the uncontrolled ascendancy of popular power, *but* of any power that is to be dreaded." "We can *only* know a substance through its qualities, but also, we can *only* know qualities as inhering in a substance. Substance and attribute are correlative, and can *only* be thought together: the knowledge of each, therefore, is relative to the other; but need not be, and indeed is not, relative to us. For we know attributes as they are in themselves, and our knowledge of them is *only* relative inasmuch as attributes have *only* a relative existence. It is relative knowledge in a sense not contradictory to absolute. It is an absolute knowledge, though of things which *only* exist in a necessary relation to another thing called a substance." "And in these days of discussion, and generally awakened interest in improvement, what formerly was the work of centuries, often requires *only* years." "Men, as well as women, do not need political rights in order that they may govern, but in order that they may not be misgoverned." This should be—"Men, as well as women, need political rights, *not* in order that they may govern, &c." The sentence where he describes his early upbringing as regards religion, cannot be construed on any known rules of grammar. "I am thus one of the very few examples, in this country, of one who has not thrown off religious belief, but never had it." The re-construction of this on grammatical principles is likely to become one of the stock exercises in our manuals of English Composition.

Critically examined, his style is wanting in delicate attention to the placing of qualifying words generally. He had apparently never thought of this matter farther than to satisfy himself that his sentences were intelligible.

Another peculiarity of grammar tending to make his style not unfrequently heavy, and sometimes a little obscure, was the excess of relatives, and especially of the heavy relatives

"which" and "who". He never entered into the distinction of meaning between those two, and "that" as a relative. Like many other writers, he used "that" only as a relief after too many "whiches". Here is an example:—"Inasmuch as any, even unintentional, deviation from truth, does that much towards weakening the trustworthiness of human assertion, *which* is not only the principal support of all present social well-being, but the insufficiency of *which* does more than anything *that* can be named to keep back civilisation, virtue, everything *on which* human happiness on the largest scale depends". Early familiarity with French is apt to produce an insensibility to the clogging effect of a great number of "whiches," and a consequent inattention to the many easy devices for keeping clear of the excess.

In the use of the pronoun "it," he did not display the care usually taken by good writers of the present day, to avoid uncertainty and ambiguity of reference.

His father's weakness for the "I know not" form is occasionally seen in him also.

Instances of looseness not falling under any special type are frequent enough. The following might possibly have been corrected, if he had lived to superintend the printing of the work where it occurs:—"The patience of all the founders of the Society was at last exhausted, except me and Roebuck".

Of arts of the rhetorical kind in the structure of his sentences, he was by no means wanting. He could be short and pithy, which goes a great way. He had likewise caught up, probably in a good measure from the French writers, his peculiar epigrammatic smartness, which he practised also in conversation. He would often express himself thus:—"It is one thing to tell the rich that they ought to take care of the poor, and another thing to tell the poor that the rich ought to take care of them". A historian, he says, must possess gifts of imagination; "and what is rarer still, he must forbear to abuse them". "With the genius for producing a great historical romance, he must

have the virtue to add nothing to what can be proved to be true." To the attacks made upon the French historians, for superficiality and want of research, he replies with a piquancy that is more than mere style:—"Voltaire gave false views of history in many respects, but not falser than Hume's; Thiers is inaccurate, but not less so than Sir Walter Scott".

He was not deficient in the power of illustration by metaphor and allusion, although he could not in this respect compare with men whose strength consists mainly in the power of expression. Moreover, as expository style requires that illustrations should be apposite, their employment is limited with precise writers.\*

As a whole, I should say that Mill was wanting in strength, energy, or momentum. His happiest strokes were of the nature of a corruscation—a lightning flash, rather than effects of impetus or mass in motion. His sentences and paragraphs are apt to be diffuse; not because of unnecessary circumstances, but from a want of steady endeavour after emphasis by good collocation and condensation. Every now and then, one of his pithy sentences comes across us, with inexpressible welcome. He is himself conscious when he is becoming too involved, and usually endeavours to relieve us by a terse summary at the close of the paragraph.

What I mean by not studying emphasis, may be exemplified by a quotation. The following shows his brief and epigrammatic style, in a fair average. The concluding sentence is what I chiefly call attention to. The passage is directed against the philanthropic theory of the protection of the poor by the rich:—

\* He had a dread of running into a figurative or florid style. I remember a curious illustration in point. He had written an article for the *Westminster Review*, but, having gone abroad before a proof was ready, he left the correcting to the editor, Hickson. I saw him on his return, and he was in a state of great annoyance at the numerous misprints that had been allowed to pass. One of these was a very excusable error. He had written "the family in the patriarchal sense," and the printer had changed it into "tents"; making, as he said, in a complaining tone, a picture.

"Mankind are often cautioned by divines and moralists against unreasonableness in their expectations. We attach greater value to the more limited warning against inconsistency in them. The state of society which this picture represents, is a conceivable one. We shall not at present inquire if it is of all others the most eligible one, even as an Utopia. We only ask if its promoters are willing to accept this state of society together with its inevitable accompaniments."

What I should wish to see strengthened here, is the emphasis upon the concluding circumstance *inevitable accompaniments*, wherein lies the whole stress of the matter. A very little change would improve it. "We only ask if the advocates of this state of society *are willing to accept its inevitable accompaniments*."

We can now view all those peculiarities in connexion with his Expository art in general, of which they are important accessories without being the main elements. Exposition, in its typical character, embodies the clear statement and adequate exemplification of principles. Where this central circumstance is well attended to, the result cannot be a failure. Now, Mill was at home here. He knew how to introduce a generality, how to state it clearly, and what amount of exemplification was needed for the ordinary reader. He could occasionally provide very good illustrations as distinct from examples, that is to say, figurative comparisons, or similes. In the strict forms of exposition, logical power comes in aid; the logician is well accustomed to see the one in the many, and the many in the one—the generality in the particulars, and the particulars supporting the generality.

There are far more trying situations, however, than the statement and exemplification of one single truth. A principle has often to be qualified by another principle; and both may need to be elucidated together. A different form of complication is brought out, when a subject has not one predicate but several, all requiring to be attended to. Very often what has to be

expounded is a highly complex idea, whose defining particulars have to be separately illustrated. These are a few of the testing forms of the expository art. Such matters cannot be despatched *currente calamo*—with the pen of a ready writer. They need careful retouching to find for each particular the best possible place. Mill has often such topics to handle, and certainly does not fall below the average of ordinary writers; yet he does not rise above being passable. Two examples, each with a special character, will show what is intended.

The first is his exposition of Nationality. I quote a part :—

“A portion of mankind may be said to constitute a Nationality, if they are united among themselves by common sympathies, which do not exist between them and any others—which make them co-operate with each other more willingly than with other people, desire to be under the same government, and desire that it should be government by themselves, or a portion of themselves, exclusively. This feeling of nationality may have been generated by various causes. Sometimes it is the effect of identity of race and descent. Community of language, and community of religion, greatly contribute to it. Geographical limits are one of its causes. But *the strongest of all* is identity of political antecedents; the possession of a national history, and consequent community of recollections; collective pride and humiliation, pleasure and regret, connected with the same incidents in the past. None of these circumstances, however, are either indispensable, or necessarily sufficient by themselves. Switzerland has a strong sentiment of nationality, though the cantons are of different races, different languages, and different religions. Sicily has hitherto felt itself quite distinct in nationality from Naples, notwithstanding identity of religion, almost identity of language, and a considerable amount of common historical antecedents. The Flemish and the Walloon provinces of Belgium,

notwithstanding diversity of race and language, have a much greater feeling of common nationality, than the former have with Holland, or the latter with France. Yet in general the national feeling is proportionally weakened by the failure of any of the causes which contribute to it. Identity of language, literature, and, to some extent, of race and recollections, have maintained the feeling of nationality in considerable strength among the different portions of the German name, though they have at no time been really united under the same government; but the feeling has never reached to making the separate states desire to get rid of their autonomy. Among Italians an identity, far from complete, of language and literature, combined with a geographical position which separates them by a distinct line from other countries, and, perhaps more than everything else, the possession of a common name, which makes them all glory in the past achievements in arts, arms, politics, religious primacy, science, and literature, of any who share the same designation, give rise to an amount of national feeling in the population, which, though still imperfect, has been sufficient to produce the great events now passing before us: notwithstanding a great mixture of races, and although they have never, in either ancient or modern history, been under the same government, except while that government extended or was extending (itself) over the greater part of the known world."

Now there is nothing here but what might be made out by attention and study; yet very little is done to assist the reader in keeping the different ideas distinct, still less in retaining a coherent view of the whole. For one thing, the proper definition should have been made into a separate paragraph, and a little more illustration given to its constituent ideas. Concrete examples might have been adduced of the working of the feeling in itself. When he came to inquire into the *causes*, he should have started a new paragraph, to keep this part quite distinct from the meaning of the fact. Then, in

stating the causes, he would have done well to have presented them numerically, and in parallel sentence forms. A much more natural arrangement could be given, thus :—Geographical limits, race, language, religion, history or political antecedents (strongest of all). Then comes the qualification—no one is indispensable in itself. His train of examples instead of being appended to the causes themselves is appended to this qualifying statement ; an arrangement of very doubtful propriety.

A still more testing situation is given in the following attempt to expound a contrasting couple—Central and Local Authority. The contrast is run upon a two-fold predicate ; that is, the comparative merits of the two forms, are put under two heads. The complication thus arising can be readily foreshadowed ; a contrasting couple of subjects, with two predicates to each, under affirmation and denial,—keeps no less than eight propositions running through the paragraph. They cannot be given in strict linear order, because they have to be compared and contrasted throughout. If we could write in several parallel columns, and if the human mind could attend to three or four trains at one moment, all this would be much easier. But conditioned as we are, the difficulties are very great. By no ingenuity can the comprehension of the theme be made easy ; but there are ways and means of alleviating the complications, the account of which is the higher art of Exposition. I quote the paragraph that I have in view :—

“To decide this question, it is essential to consider what is the comparative position of the central and the local authorities, as to capacity for the work, and security against negligence and abuse. . In the first place, the local representative bodies and their officers are almost certain to be of a much lower grade of intelligence and knowledge, than Parliament and the national executive. Secondly, besides being themselves of inferior qualifications, they are watched by and accountable to, an inferior public opinion. The public under whose eyes they



able polemical aptitude. But I shall speak now of his persuasive power, which I conceive to be very great on the whole, and susceptible of being precisely defined.

The power of persuasion was with him not much a matter of mere style ; it lay more in his command of thoughts, and in his tact in discerning what would suit the persons addressed. When he set himself to argue a point, his information and command of principles usually enabled him to exhaust his case. His political writing is enough to show this.

It was seldom that he was deficient in knowledge of his audience. If he ever failed here, it was in matters of religion, where he was necessarily little informed, and on the women question, where his feelings carried him too far.

Not only could he shape arguments to the reason, properly so called, he could also address the feelings. The *Liberty* and the *Subject of Women*, as well as his political writing generally, exemplify what might be called impassioned oratory ; they leave nothing unsaid that could enlist the strongest feelings of the readers. His best Parliamentary speeches appealed to the understanding and to the feelings alike, and he seldom, so far as I can judge, lost ground for want of suiting himself to a most difficult assembly. Although he could not clothe his feelings with the richness of poetry, he could warm with his subject, and work by the force of sympathy.

All this, as I have already observed, had to do with knowledge and thinking power, more than with style. In the oratory of rhetoric, he was entirely wanting. He could appeal to men's feelings by suitable circumstances plainly and even forcibly stated ; but that luxuriance of verbal display, whereby the emotions can be roused with a hurricane's might, was not a part of his equipment. He could not be an orator in the same sense as the two Pitts, Burke, Canning, Brougham, Macaulay, D'Israeli, or any of our rhetorical writers ; although I am not sure that he might not often have rivalled such men in actual effect, by the gifts that were peculiarly his own.

The powerful adjunct of Wit was hardly within his reach, any more than rhetorical display in general. He had the sense of humour, but not a sufficient creative power to embody it in writing ; and he was careful not to attempt what he could not do well. I can recall but one example of real Wit such as might have come from Sydney Smith or Fonblanque.

In his article on Corporation and Church Property, he replies to the stock arguments against diverting old foundations. He makes full allowance for compensation to present holders of life interests. Still this does not appease the opposition :—

“Would you rob the Church? it is asked. And at the sound of these words rise up images of rapine, violence, plunder ; and every sentiment of repugnance which would be excited by a proposal to take away from an individual the earnings of his toil or the inheritance of his fathers, comes heightened in the particular case by the added idea of sacrilege.

“But the Church ! Who is the Church ? Who is it that we desire to rob ? Who are the persons whose property, whose rights we are proposing to take away ?

“Not the clergy ; from them we do not propose to take anything. To every man who now benefits by the endowment, we have said that we would leave his entire income ; at least until the State shall offer, as the purchase money of his services in some other shape, advantages which he himself shall regard as equivalent.

“But if not the clergy, surely we are not proposing to rob the laity : on the contrary, they are robbed now, if the fact be, that the application of the money to its present purpose is no longer advisable. We are exhorting the laity to *claim* their property out of the hands of the clergy ; who are not the Church, but only the managing members of the association.

“*Qui trompe-t-on ici ?* asks Figaro. *Qui vole-t-on ici ?* may well be asked. What man, woman, or child, is the victim of this robbery ? Who suffers by the robbery when everybody robs nobody ? But though no man, woman, or child is robbed,

I am tempted here to give one of his letters to Thornton, belonging to the present year (1860) ; as conveying his first impressions of the working of the change in the Government of India. He repeatedly adverted to the subject in the correspondence of the next few years ; and his letters will be afterwards of use in comparing his prophecies with the actual events.

"Your letter of September 19 gave me much pleasure, because it contained better and more encouraging accounts of your health, and also because it said that things were likely to be made pleasanter to you at the India House by changes in the mode of transacting business. I shall be greatly interested by hearing more of these changes, since, as you are aware, I think that the practical goodness of a government depends, much more than is generally supposed, on the forms of business. It is a comfort to hear of any changes for the better. Unfortunately, the deteriorations in the structure of the instrument of Government in detail, which I always feared would follow from the substitution of the traditions of the Government Offices for those of the India House, seem to be taking place still more rapidly than I looked for. If the Council at Calcutta is to be abolished, and a Cabinet of Secretaries put in its place, as the newspapers say, and as is too probable, the change will be almost fatal : for the Members of Council are the only high administrative Officers not dependent on the will of the Governor-General, and their Minutes are the only Channel through which an independent and ungarbled opinion necessarily reaches the home authorities. The difficulties of governing India have so much increased, while there is less and less wisdom employed in doing it, that I begin to despair of the whole subject, and almost believe that we are at the beginning of the end."

It was in 1860, that he wrote his volume on *Representative Government*. The state of the Reform question, which led him to prepare his pamphlet on Reform, was the motive of the still

larger undertaking, his principal contribution to a Philosophy of Politics. He says in the Preface, that the chief novelty of the volume is the bringing together, in a connected form, the various political doctrines that he had at various times given expression to : but the mere fact of viewing them in connexion necessarily improved their statement and bearings ; and the six or eight months' additional elaboration in his fertile brain could not but infuse freshness into the subject.

In my estimate of Mill's genius, he was first of all a Logician, and next a social philosopher or Politician. The *Political Economy* and the *Representative Government* constitute his political outcome. People will differ as to his conclusions, but certainly whoever wishes to judge of any matter within the scope of the *Representative Government* should first see what is there said upon it ; and the work must long enter into the education of the higher class of politicians. The chapter on the "Criterion of a good form of Government" contains an exceedingly pertinent discussion of the relation between Order and Progress ; and demonstrates that Order cannot be permanent without Progress ; a position in advance of Comte. The third chapter demolishes the fond theory entertained by many in the present day that the best government is "Absolute authority in good hands". Then comes a question that needs all the author's delicacy, tact, and resource—Under what conditions is representative government applicable ? But his strongest point throughout is the exposition of the dangers and difficulties attending on Democracy. This was one of his oldest themes in the *Westminster Review* ; he has put it in every possible light, and discussed with apostolic ardour all the contrivances for withstanding the tyranny of the majority. He took up with avidity Mr. Hare's scheme of Representation, and never ceased to urge it as the greatest known improvement that representative institutions are susceptible of. He dismisses Second Chambers as wholly inadequate to the purpose in view, however useful otherwise. The discussions

on the proper functions of the Local Governing Bodies, on Dependencies, and on Federations, are all brimful of good political thinking. He passes by the subject of Hereditary Monarchy. Both he and Grote were republicans in principle, but they regarded the monarchy as preferable to the exposing of the highest dignity of the state to competition. From my latest conversations with Mill, I think he coincided in the view that simple Cabinet Government would be the natural substitute for Monarchy.

In 1861, he began to turn his thoughts to a review of Hamilton's Philosophy. Writing to me in November, he says, "I mean to take up Sir William Hamilton, and try if I can make an article on him for the *Westminster*". He chose the *Westminster* when he wanted free room for his elbow. He soon abandoned the idea of an article. In December he said:—"I have now studied all Sir W. Hamilton's works pretty thoroughly, and see my way to most of what I have got to say respecting him. But I have given up the idea of doing it in anything less than a volume. The great recommendation of this project is, that it will enable me to supply what was prudently left deficient in the *Logic*, and to do the kind of service which I am capable of to rational psychology, namely, to its *Polemik*."

A month before, he had written to Thornton, in terms that showed how well he had recovered his natural buoyant spirits, and his enjoyment of life.

"Life here is uneventful, and feels like a perpetual holiday. It is one of the great privileges of advanced civilization, that while keeping out of the turmoil and depressing wear of life, one can have brought to one's doors all that is agreeable or stimulating in the activities of the outward world, by newspapers, new books, periodicals, &c! It is, in truth, too self-indulgent a life for any one to allow himself whose duties lie among his fellow-beings, unless, as is fortunately the case with me, they are mostly such as can be better fulfilled at a distance from their society, than in the midst of it."

He was interrupted for a time by the events in America. In January, 1862, he wrote in *Fraser* his paper on the Civil War. He expected it to give great offence, and to be the most hazardous thing for his influence that he had yet done.

After spending the summer in a tour in Greece and Asia Minor, he wrote again on the American Question, in a review of Cairnes's book in the *Westminster*. This done, he set to the *Hamilton*, which was the chief part of his occupation for the next two years. His interruptions were—the article on John Austin in the *Edinburgh*, in Oct., 1863, the two articles on Comte to the end of 1864, and the revision of the *Political Economy*.

I had a great deal of correspondence with him while he was engaged with Hamilton. He read all Hamilton's writings three times over; and all the books that he thought in any way related to the subjects treated of. Among other things, he wrote me a long criticism of *Ferrier's Institutes*. "I thought Ferrier's book quite *sui generis* when I first read it, and I think so more than ever after reading it again. His system is one of pure scepticism, very skilfully clothed in dogmatic language." He was much exercised upon the whole subject of Indestructibility of Force. His reading of Spencer, Tyndall, and others, landed him in a host of difficulties, which I did what I could to clear up. His picture of Hamilton grew darker as he went on; chiefly from the increasing sense of his inconsistencies. He often wished that Hamilton was alive to answer for himself. "I was not prepared for the degree in which this complete acquaintance lowers my estimate of the man and of his speculations. I did not expect to find them a mass of contradictions. There is scarcely a point of importance on which he does not hold conflicting theories, or profess doctrines which suppose one theory while he himself holds another. It almost goes against me to write so complete a demolition of a brother philosopher after he is dead, not having done it while he was alive."

During my stay in London in the summer of 1864, he showed me the finished MS. of a large part of the book. I offered a variety of minor suggestions, and he completed the work for the press the same autumn.

Of the many topics comprised in the volume, I shall advert only to one or two of the principal. After following Hamilton's various theories through ten chapters, he advances his own positive view of the Belief in an External World. Having myself gone over the same ground, I wish to remark on what is peculiar in his treatment of the question.

I give him full credit for his uncompromising Idealism, and for his varied and forcible exposition of it. In this respect he has laboured to educate the thinking public in what I regard as the truth. But in looking at his analysis in detail, while I admit he has seized the more important things, I do not exactly agree with him either as to the order of statement, or as to the relative stress put upon the various elements of the Object and Subject distinction.

In the first place, I would remark on the omission of the quality of *Resistance*, and of the muscular energies as a whole, from his delineation of the object or external world. In this particular, usage and authority are against him, to begin with. The connexion of an External World with the Primary Qualities has been so long prevalent, that surely there must be some reason or plausibility in it. His own father and Mansel are equally emphatic in setting forth Resistance as the foundation fact of Externality. Mill himself, however, allows no place for Resistance in his psychological theory. In a separate chapter on the Primary Qualities of Matter, he deals with Extension and Resistance, as products of muscular sensibility, and as giving us our notions of *Matter*, but he thinks that simple tactile sensibility mingles with resistance, and plays as great a part as the purely muscular ingredient; thus frittering away the supposed antithesis of muscular energy and passive sensibility. Now, for my own part, I incline to the usage and opinion of our pre-

decessors in putting forward the contrast of active energy and passive feeling as an important constituent of the subject and object distinction; and, if it is to be admitted at all, I am disposed to begin with it, instead of putting it last as Mr. Spencer does, or leaving it out as Mill does. It does not give all that is implied in Matter, but it gives the nucleus of the composite feeling, as well as the fundamental and defining attribute.

The stress of Mill's exposition rests on the *fixity of order* in our sensations, leading to a constancy of recurrence, and a belief in that constancy, which goes the length of assuming independent existence. Although he shows a perfect mastery of his position, I do not consider that he has done entire justice to it, from not carrying along with him the full contrast of the objective and the subjective—the Sensation and the Idea. Indeed, the exposition is too short for the theme; the reader is apt to be satisfied with the portable phrase—"permanent possibility of sensation," which helps him to one vital part of the case, but does not amount to a satisfactory equivalent for an External and Independent World. There would have been more help in an expression dwelling upon the "common to all," in contrast with the "special to me," to use one of Ferrier's forms of phraseology. This ground of distinction is not left unnoticed by Mill, but it is simply mentioned.

His chapter applying the theory to our belief in the permanent existence of Mind is, I think, even more subtle than the preceding one on Matter. The way of disposing of Reid's difficulty about the existence of his fellow-creatures is everything that I could wish. It is when, in the concluding paragraph, he lays down, as final and inexplicable, the Belief in Memory, that I am unable to agree with him. This position of his has been much dwelt upon by the thinkers opposed to him. It makes him appear, after all, to be a transcendentalist like themselves, differing only in degree. For myself, I never could see where his difficulty lay, or what moved him to say



that the belief in memory is incomprehensible or essentially irresolvable. The precise nature of Belief is no doubt invested with very peculiar delicacy, but, whenever it shall be cleared up, we may very fairly suppose it capable of accounting for the belief that a certain state now past as a sensation, but present as an idea, was once a sensation, and is not a mere product of thought or imagination. (Cf. *The Emotions and the Will*, 3rd. edit., p. 532.)

I may make a passing observation on the chapter specially devoted to Mansel's *Limits of Religious Thought*. It is a considerable digression in a work devoted to Hamilton; but Mansel's book touched Mill to the quick; in private, he called it a "loathsome" book. His combined argumentative and passionate style rises to its utmost height. Mansel sarcastically described his famous climax—"to hell I will go"—as an exhibition of taste and temper. That passage was scarcely what Grote called it, a Promethean defiance of Jove, inasmuch as the fear of hell never had a place in Mill's bosom; it sprang from the strength of his feelings coining the strongest attainable image to give them vent.\*

Mill could not help advertng to Hamilton's very strong and paradoxical assertions about Free-Will; but, as he never elaborates a consecutive exposition of the question, I doubt the propriety of making these assertions a text for discussing it at full. Mill's chapter is either too much or too little; too much as regards his author, too little as regards the subject. The connexion of Punishment with Free-will should be allowed only under protest; the legitimacy and the limits of punishment make a distinct inquiry. Punishment, psychologically viewed, assumes that men recoil from pain; there may be other springs of action besides pain or pleasure; but as regards such, both re-

\* Grote thought that the phrase was an echo of something occurring in Ben Jonson; where a military captain's implicit obedience is crowned by the illustration—"Tell him to go to hell, to hell he will go". I have never got any clue to the place.

ward and punishment are irrelevant. I think Mill very successful in showing that moral good and evil are noways bound up with the question of the Will. He is not too strong in his remonstrance against Hamilton's attempt to frighten people into Free-Will by declaring that the existence of the Creator hangs upon it. It was quite in Hamilton's way to destroy all the other arguments in favour of a doctrine that he espoused, in order to give freer course to his own. He damages the advocacy of Free-Will by his slashing antinomy of the two contrary doctrines. It is certainly a clearing of the ground, if nothing more, to affirm, as he does so strongly, that "a determination by motives cannot escape from necessitation". Such admissions give an opponent some advantage, but only as respects him individually. The general controversy, however, must proceed on different lines from his, and hence the waste of strength in following his lead.

Hamilton's attack on the study of Mathematics was a battery of learned quotations intended to confound Whewell and Cambridge. It is not very convincing; it hardly even does what Mill thinks hostile criticism tends to do, namely, to bring out the half-truth neglected by the other side. It was not worth while to write so long a chapter in reply; but Mill, partly from what he learnt from Comte, and partly from his own logical studies, had a pat answer to every one of Hamilton's points. Most notable, in my view, is the paragraph about the disastrous influence of the mathematical method of Descartes on all subsequent speculation. He seems there to say that the *a priori* spirit has been chiefly kept up by the example of Mathematics. Now, I freely admit that the axioms of mathematics have been the favourite illustration of Intuition; but there is no certainty that, in the absence of that example, Intuitionism would not have had its full swing during the last two centuries. Mill admits that the crudity of Bacon's Inductive canons had an equally bad effect on English speculation; but all this shows simply that error is the parent of error.

The two subjects taken up while the *Hamilton* was still in hand—John Austin and Comte—deserve to be ranked among the best of his minor compositions. The “Austin” article took him back to his early days when he worked with Bentham and attended the lectures of Austin at University College. It does not seem to contain much originality, but it is a logical treat. The two “Comte” articles are still more valuable, as being Mill’s contribution to the elucidation of Comte’s Philosophy. It will be long ere an equally searching and dispassionate estimate of Comte be given to the world; indeed, no one can again combine the same qualifications for the work.

The publication of the *Hamilton* in the spring of 1865 was followed by a crowd of events. Mill had already embarked on an article on Grote’s *Plato*, which had lately appeared. He had arranged with his publisher for cheap reprints of the *Political Economy*, the *Liberty*, and the *Representative Government*. Then came the requisition to stand for Westminster, by which his name blazed out into a sudden notoriety, under which the cheap volumes went off like wildfire, while there was an increased demand for the *Logic*. His letter, announcing his compliance with the requisition on certain conditions, was a surprise. It was scarcely to be expected that he could feel himself “honoured” by being elected to Parliament, in the maturity of his great reputation. Perhaps we must go farther back to account for his ready compliance. He had felt it acutely, as a disadvantage of his being placed in the India House, that he could not enter Parliament; and again, in the days when he was heading the philosophic radicals, he was conscious of the weakness of his position in not being himself in the House of Commons. He had not yet ceased to be a practical politician, although he had become many things besides; and the long slumbering idea of being in Parliament was suddenly wakened into life. His anticipation of success in the election was not sanguine; but his supporters were

enthusiastic, and his appearance at the meetings of the electors procured daily accessions to his cause. He had been hitherto very little seen by the public: and neither friends nor foes had any adequate conception of his resources and his readiness as a speaker. Above all things, the attempts to entrap him by cunningly devised questions most signally recoiled upon the authors.

Half of his year for the next three years was given up to attendance in the House and engrossment with public questions. I am not about to criticize his career as a member of Parliament. The part of the *Autobiography* where he is perhaps most self-complacent, is what relates to his speeches and doings in that capacity. He set a good example of perfect party loyalty, combined with the assertion of difference of opinion on particular questions. For a number of years his relations with Mr. Gladstone had been far more cordial and intimate than the outer world was aware of. His idea of ventilating questions that had as yet scarcely any supporters, appears to me to be carried to an extreme. He was not an orator physically; but he composed and delivered speeches possessing all the qualities of his published writings; that is to say, original in thought, powerfully reasoned, and full of passionate fire when the occasion demanded.

In the six months' recess he carried on his philosophical and other writings. In the autumn and winter of 1865, he had to finish his long article on *Plato*, on which he bestowed great pains, having taken the trouble to re-read the whole of Plato in the original. To the reader of Grote, the article does not impart much that is absolutely new; but, Plato being an early subject of his as well as of his father's, his handling has freshness and gusto.

The extraordinary stimulus given to the sale of his books prematurely exhausted the current edition of the *Logic*; and it had been his intention to revise it for the next edition (the Sixth). This had to be seen to, along with the "*Plato*," during

the same recess. His revision, on this occasion, partly consisted in improving the "Induction" by new examples. I referred him to Brown Séquard's interesting research on Cadaveric Rigidity, and induced him to read the same author's volume of *Researches on the Nervous System*. I also obtained from Thomas Graham a complete set of his researches on Gases and Liquids; pointing his attention to what I thought most available. It was in this edition that he first combated Mr. Spencer's doctrine of "The Inconceivability of the Opposite" as a test of truth.

The same winter recess was not allowed to conclude without another distraction. The students of St. Andrews had, without asking his leave, elected him Lord Rector. On its being announced to him, he wished to decline. This, however, was not easy after the thing was done; and he accepted on the understanding that he was not to deliver the Rectorial Address till next year.

Meantime, his letters to me were full of the notices that had come out on the *Hamilton*. When the session of 1866 was concluded, after a tour in the Alps and Pyrenees, he settled down at Avignon to write his Address for St. Andrews, and to answer the attacks on *Hamilton* for the third edition; both which feats he accomplished before the opening of the session of 1867.

The St. Andrews Address was a very lengthened performance; its delivery lasted three hours. It aimed at a complete survey of the Higher Education. Its absolute value is considerable; but in relation to the time, place, and circumstances, I consider it to have been a mistake. Mill had taken it into his head that the Greek and Roman classics had been too hardly pressed by the votaries of science, and were in some danger of being excluded from the higher teaching; and he occupies nearly half of the address in vindicating their importance. The second half is a vigorous enforcement of the claims of Science.

' The performance was a failure, in my opinion, for this simple reason, that he had no conception of the limits of a University curriculum. The Scotch Universities have been distinguished for the amount of study comprised in their Arts Degree. Mill would have them keep up the Classics intact, and even raise their standard; he would also include a complete course of the Primary Sciences—Mathematics, Physics, Chemistry, Physiology, Logic, and Psychology—to which he would add Political Economy, Jurisprudence, and International Law. Now at present the obligatory sciences are Mathematics, Natural Philosophy, Logic, and Moral Philosophy. If he had consulted me on this occasion, I should have endeavoured to impress upon him the limits of our possible curriculum, and should have asked him to arbitrate between the claims of Literature and Science, so as to make the very most of our time and means. He would then have had to balance Latin and Greek against Chemistry, Physiology, and Jurisprudence; for it is quite certain that both these languages would have to be dropped absolutely, to admit his extended science course. In that case he would have been more careful in his statements as to the Greek and Latin languages. He would not have put these languages as synonymous with "literature"; and he would have made much more allowance for translations and expositions through the modern languages. He would have found that at the present day we have other methods of correcting the tendency to mistake words for things than learning any two or three additional languages. He would not have assumed that our pupils are made all "to think in Greek"; nor would he have considered it impossible to get at the sources of Greek and Roman History without studying the languages. If he had had a real opponent, he would not have given the authority of his name to the assertion that Grammar is "elementary Logic". His mode of speaking of the style of the ancient writers, to my mind at least, is greatly exaggerated. "Look at an oration of Demosthenes; there is nothing in it

which calls attention to itself as style at all." "The Athenians do not cry out—What a splendid speaker, but—Let us march against Philip." He also gives way to the common remark that the teaching of Latin and Greek could be so much improved as to make it an inconsiderable draft upon a pupil's energies. On this point he had no experience to go upon but his own, and that did not support his position.

In the scientific departments he carries out strictly the Comte hierarchy of the fundamental sciences, and, in this respect, the address was valuable as against the mischievous practice of culling out a science from the middle of the series, say Chemistry, and prescribing it by itself to the exclusion of its forerunners in the hierarchy. While he speaks fairly and well on the Mathematical and Physical Sciences, his remarks on the Moral and Political display, as usual, the master's hand. He next goes on to talk of Free Thought, on which he maintains a somewhat impracticable ideal for our Universities. From Science he proceeds to Art, and enforces a favourite theme—the subservience of Poetry to Virtue and Morality. One feels that on this topic a little more discrimination was necessary; art being a very wide word. His conclusion was a *double entendre*. "I do not attempt to instigate you by the prospect of direct rewards, either earthly or heavenly; the less we think about being rewarded in either way, the better for us."

In the reception given to the Address, he was most struck with the vociferous applause of the Divinity students at the Free-thought passage. He was privately thanked by others among the hearers for this part.

The Third Edition of the *Hamilton* contained replies to the host of critics that had assailed it. The additional scope given to the author's polemical ability greatly enhanced the interest of the book. In answering the attacks made on his criticism of Hamilton's doctrines on the Relativity of Knowledge and Philosophy of the Conditioned, as well as in the reply to Mansel on

Religion, he showed to considerable advantage. In defending the Psychological Theory of the Belief in an External World, he grappled with the stock arguments against Idealism. He made least way in the Free-Will controversy ; affording, as I think, a confirmation of the impropriety of carrying on so many distinct questions together.

His next literary project was the editing his father's *Analysis*. This was commenced in the recess of 1867, and finished in the following year, being brought out early in 1869. He called it "a very great relief from its extreme unlikeness to parliamentary work, and to parliamentary semi-work, or idleness". I had necessarily a long correspondence with him on the allocation of topics ; but each of us took our own line in regard to the doctrines. Coincidence of view was the rule, the discrepancy seldom went beyond the mode of statement, the chief exception being the topic of Belief. The work contains perhaps the best summary of his psychological opinions, although the *Hamilton* shows them in the more stirring shape of polemics.

Before this work came out, his Parliamentary career was at an end. The circumstances that led to his defeat in the election of 1868 are detailed by himself. They included the singular indiscretion of his allowing his subscription to Mr. Bradlaugh to be made public before his own election day ; very unlike his usual circumspectness. His apology is somewhat lame ; and does not take account of the fact that he was contesting the seat in the interest of other people and at their expense. So energetically did the opposition ply the weapon thus put into their hands, that they may have owed their success to it alone. Although on public grounds he regretted being no longer in Parliament, he was not sorry to resume his quiet and his leisure for other work.

The pamphlet entitled *England and Ireland*, brought out in



the beginning of 1868, declared, as he says, his whole mind on the subject of Ireland—chiefly as regarded the Land—and is couched in very strong language indeed. He believed that this pamphlet helped to determine Mr. Gladstone to commence his Irish Legislation with the Church, leaving the Land to a later operation.

The year 1869, his first year of release, saw the publication of his last book—*The Subjection of Women*, together with the two first articles in his fourth volume of *Dissertations*—"Endowments," and "Labour and its claims," a review of Mr. Thornton's work on that subject.

The volume on the *Subjection of Women*, he tells us, was first written in 1861. It was, he says, a joint production; portions were written by Miss Taylor, while his share was the result of innumerable conversations and discussions with his wife. However the merits be partitioned, it is a book of very marked character. It is the most sustained exposition of Mill's life long theme—the abuses of power. The extent of the illustration and the emphasis of the language render it the best extant homily on the evils of subjection in general; while the same arts are maintained in dealing with the application to the disabilities of women. This case, which of all others most engaged his feelings, is, I think, the one instance where he may be charged with overstraining. In discussing political freedom at large, he is always sufficiently alive to the necessities of government; in the present question, he leads us to suppose that the relations of men and women between themselves may work upon a purely voluntary principle. He abstains here and elsewhere from advocating divorce pure and simple, because of the complications attending the question: while he does not show what is the remedy when a man and a woman, united by the marriage bond, are unable to co-operate as equal partners.

His handling of the mental equality of the sexes is, to my

mind, open to exception. In the intensity of his special pleading on this question, he hardly avoids contradicting himself; while he postulates a degree of equality that does not chime in with the experience of the least biassed observers. He grants that women are physically inferior, but seems to think that this does not affect their mental powers. He never takes account of the fact, that the large diversion of force for the procreative function must give some general inferiority in all things where that does not come in, unless women are made on the whole much stronger than men. In an allusion to his experience of the Independent States of India, he tells us that in three cases out of four, if a superior instance of good government occurs, it is in a woman's reign; which looks like the fallacy of proving too much.

Without entering into an argument with him on his equality view, I expressed my doubts as to the expediency of putting this more strongly than people generally would be willing to accept; inasmuch as the equality of rights did not presuppose absolute equality of faculties. He replied with much warmth, contending that the day of a temporizing policy was past; that it was necessary to show, not simply that the removal of restrictions would leave things as they are, but that many women are really capable of taking advantage of the higher openings. And further, he urged, it was necessary to stimulate the aspirations of women themselves, so as to obtain proofs from experience as to what they could do.

In Sir James Stephen's work, the question of the Subjection of Women undergoes a very full handling; and the conclusions reached are of course entirely different from Mill's. This is his remark in introducing the subject:—

"I might give in proof or illustration of this the whole of his essay on the Subjection of Women, a work from which I dissent from the first sentence to the last, but which I will consider on the present occasion only with reference to the particular topic of equality, and as the strongest distinct illus-

tration known to me of what is perhaps one of the strongest, and what appears to me to be by far the most ignoble and mischievous of all the popular feelings of the age."

Sir James's concessions, however, are important:—

"I freely admit that in many particulars the stronger party has in this, as in other cases, abused his strength, and made rules for his supposed advantage, which in fact are greatly to the injury of both parties. It is needless to say anything in detail of the stupid coarseness of the laws about the effects of marriage on property, laws which might easily be replaced by a general statutory marriage settlement analogous to those which every prudent person makes who has anything to settle. As to acts of violence against women, by all means make the law on this head as severe as it can be made without defeating itself. As to throwing open to women the one or two employments from which they are at present excluded, it is rather a matter of sentiment than of practical importance."

A considerable portion of his labours during the last three years of his life was given to the Land Question, which he greatly helped to mature for future settlement. Under this movement he renewed his former fight for peasant properties, and started the new heresy of the unearned increment. It was his pride to co-operate in all these questions with the working classes and their leaders, and, had he lived, he would have been of unspeakable value as a mediator in the impending struggles between labour and capital, and between the working population generally and the heads of political parties. He would not, however, I think, ever have been a working-men's champion on their own lines. He would not have held out any tempting bribe of immediate amelioration such as to inspire the highest efforts of the existing generation. His most sanguine hopes were of a very slow progress in all things; with the sole exception, perhaps, of the equality-of-women question, on which his feelings went farther than on any other.

Grote died in June, 1871. Mill disliked his being buried in the Abbey, but of course attended the funeral. He resisted the proposal that he should be one of the pall-bearers, and gave way only under great pressure. As he and I walked out together, his remark was — "In no very long time, I shall be laid in the ground with a very different ceremonial from that".\* He seemed to be now conscious of a break-up in his physical system. He had in the course of the next two years several prostrating attacks, but with marvellous recoveries. His last illness, as is well known, was due to a local endemic disease. Three days before his death, he had walked fifteen miles on a botanical excursion. There was evidently still a reserve of power in his constitution, which might have tided him over several more years of useful work, but could not carry him through a malignant infection.

The posthumous *Essays on Religion* do not correspond with what we should have expected from him on that subject. Never, so far as I know, did he give any hint of wishing or attempting to re-construct a system of theism on a scientific basis. In one sentence in the *Hamilton* he spoke approvingly of the argument from Design, but laid more stress on its persuasiveness than on its soundness. The *Autobiography* represented his attitude towards Religion as pure negation, or nescience, just as his father's had been.

The Essay on *Nature* paints the world black enough, and from that he was not likely to rise to a flattering estimate of Nature's God. I think he should have widened his survey considerably, before pronouncing as he does. For, although there are good grounds for many of his statements of fact, the case is by no means complete. By his own showing in other places, many happy lives have been passed in the world as we

\* It so happened, however, that a prayer was delivered at his own interment, by the protestant pastor at Avignon, who thereby got himself into trouble, from Mill's known scepticism, and had to write an exculpation in the local newspaper. Mill had made a friend of this pastor, a very intelligent and liberal-minded man.

find it, and he looked forward to a time when happiness might be the rule instead of the exception. I should have expected him to push the analysis of the causes of evil a step farther; namely, first, to the inadequacy of man's intellectual force to cope with the obscurities of nature, and next to the want of ability to counteract known causes of mischief. A remark that he once made regarding his own temperament, is a part of the case in considering nature: he said, in answer to some gloomy utterance of Grote's, that with himself the difficulty was not so much to realize pleasure as to keep off pain; and it is the fact that there are many pleasurable resources in the world, if we could only submerge the attendant miseries. His exposure of the insufficiency of Nature as a *guide* is pure logic, and in that he was not likely to be wanting. The so-called Light of Nature is mere darkness; while we are often notoriously incapable of following the light we have. We are only just beginning to track the secrets of disease; including the forms of pestilence that from time to time commit wholesale ravages alike upon man and beast.

The Essay on the *Utility of Religion* is a farther illustration of his old theme (in the *Utilitarianism*) as to the sufficiency of the sanctions and motives of the present life for sustaining, not only the inferior moral virtues, but also the elevated sentiments of mankind. He here puts forward a sort of Religion of Humanity, constructed on the basis of men's amiable feelings towards one another. To this he had been led, I have no doubt, in the first instance, by Comte, although the filling-up is his own.

But by far the most laboured of the Essays is the last—uniting a destructive and a constructive *Theism*. The destructive part is in accordance with all his antecedents; it is the constructive part that we were not prepared for. It was indeed quite compatible with his warm human sympathies, and with his long-standing doctrine that every creed is likely to contain some portion of truth, that he should try to ascertain

what there was in religion to commend it to the best minds among its adherents: our doubt would have been whether, after painting the world in such gloomy hues, he could set up a Deity that would replace, in the hearts of men, the one that he undertook to destroy. Religion, we know, is exceedingly variable; but there are some things in it not easy to dispense with. Until the advent of the modern sentimental Theism, it has usually contained the idea of authority and subjection—the prescription of duties with rewards and punishments attached to them. Men's deities in all early ages had to be propitiated as powers capable of evil at least, if not also of good. In pure Monotheism, the unbounded beneficence of the Deity has been an indispensable attribute, in spite of the difficulties attending it. Plato insisted that this belief should be supported by state penalties; and we know how essential it is regarded in the present day by those of the Theists that do not accept revelation. All these points of support Mill dispensed with; while working upon the idea, so repugnant to the religious worshipper, of putting a logical limitation and restriction on the great object of worship. A Being that would not interfere to do us either harm or good can scarcely excite in us any strong regards; at least until we have undergone a new education. The supposed limitations of his power, besides being strangely at variance with the undeniable vastness and complex adjustment of the world, would seem fatal to his ascendancy in our minds.

The speculation is equally precarious as regards a future life. Mill hardly does justice to the natural difficulties of reproducing human existence, after death, for an eternal duration; and yet casts doubts on the omnipotence of the Power that is to perform the miracle.

Seeing that the only argument for Theism that Mill put any value upon, was the argument from Design, it is unfortunate that he should have considered nine pages sufficient for its discussion. The handling is not only short, but extremely

unsatisfactory. It is what we might suppose to be the first of the three redactions that all his writings went through ; a mere rough note, to be worked up in one or two subsequent elaborations. His attempt to show that the argument rises above Analogy into the sphere of Induction is not, as I conceive, a logical success ; at least, it stands in need of a much more detailed justification. He ought manifestly to have disposed of the objections advanced by Hume and Kant respectively : in so doing, he would have made his own position clearer, if not stronger. He very properly introduces into the case the canons of Induction, strictly so called, and the conditions (first distinctly stated by himself) of proof from Analogy ; he ought farther to have brought into play his doctrine of what constitutes a logical Hypothesis, and have shown the bearings of this upon the supposed Anthropomorphic origin of the Universe.

Both his Theism and his estimate of Christianity as founded on the character of Christ, are concessions to the existing Theology ; and, as is usual in such cases, the inch has been stretched to an ell. As regards the beneficial influence that may continue to be exerted by our contemplation of Jesus Christ, I quote a few sentences as the groundwork of some remarks.

"Above all, the most valuable part of the effect on the character which Christianity has produced by holding up in a Divine Person a standard of excellence and a model for imitation, is available even to the absolute unbeliever and can never more be lost to humanity. For it is Christ, rather than God, whom Christianity has held up to believers as the pattern of perfection for humanity. It is the God incarnate, more than the God of the Jews or of Nature, who being idealised has taken so great and salutary a hold on the modern mind. And whatever else may be taken away from us by rational criticism, Christ is still left ; a unique figure, not more unlike all his precursors than all his followers, even those who had the direct benefit of his personal teaching. It is of no use to say that

Christ as exhibited in the Gospels is not historical and that we know not how much of what is admirable has been superadded by the tradition of his followers. The tradition of followers suffices to insert any number of marvels, and may have inserted all the miracles which he is reputed to have wrought. But who among his disciples or among their proselytes was capable of inventing the sayings ascribed to Jesus or of imagining the life and character revealed in the Gospels? Certainly not the fishermen of Galilee ; as certainly not St. Paul, whose character and idiosyncrasies were of a totally different sort."

"But about the life and sayings of Jesus there is a stamp of personal originality combined with profundity of insight, which, if we abandon the idle expectation of finding scientific precision where something very different was aimed at, must place the Prophet of Nazareth, even in the estimation of those who have no belief in his inspiration, in the very first rank of the men of sublime genius of whom our species can boast. When this pre-eminent genius is combined with the qualities of probably the greatest moral reformer, and martyr to that mission, who ever existed upon earth, religion cannot be said to have made a bad choice in pitching on this man as the ideal representative and guide of humanity ; nor, even now, would it be easy, even for an unbeliever, to find a better translation of the rule of virtue from the abstract into the concrete, than to endeavour so to live that Christ would approve our life. When to this we add that, to the conception of the rational sceptic, it remains a possibility that Christ actually was what he supposed himself to be—not God, for he never made the smallest pretension to that character and would probably have thought such a pretension as blasphemous as it seemed to the men who condemned him—but a man charged with a special, express, and unique commission from God to lead mankind to truth and virtue ; we may well conclude that the influences of religion on the character which will remain after rational criticism has done its utmost against the evidences of religion, are well worth preserving, and



that what they lack in direct strength as compared with those of a firmer belief, is more than compensated by the greater truth and rectitude of the morality they sanction."

It seems, at first glance, a bold proceeding to take to pieces the Christ of Christianity, and to appropriate just so much of him as suits a "rational criticism". Something of this kind has already been tried by the Unitarians, but with small success, if that is to be measured by the extent of popular reception. It would seem, in this as in other parts of religion, that what the rationalist disapproves of most, the multitude like best.

We are, of course, at liberty to dissent from the prevailing view, which makes Christ a divine person. But to reduce a Deity to the human level, to rank him simply as a great man, and to hold ideal intercourse with him in that capacity, is, to say the least of it, an incongruity. Historians and moralists have been accustomed to treat with condemnation those monarchs that, after being dethroned, have accepted in full the position of subjects. Either to die, or else to withdraw into dignified isolation, has been accounted the only fitting termination to the loss of royal power. So, a Deity dethroned should retire altogether from playing a part in human affairs, and remain simply as an historic name.

The point of congruity or propriety is not, as I conceive, the worst objection to Mill's proposal. The doctrines, prescriptions, or sayings of one believed to be a God, must all have a religious bearing; they are properly adapted to men in their religious capacity. They may often refer to matters of mere worldly conduct, but the religious side is still a vital part of them. If religion were done away with, to the extent that Mill would have it, those sayings of Christ must lose their suitability to human life as so transformed. "Forgive that ye may be forgiven (by God)"—is no longer applicable. The best guidance, under such altered circumstances, would be that furnished by the wisest of purely secular teachers. The same applies to Christ as an example. He is so to those that accept him in his own

proper character, and who view the world as he viewed it. In a purely secular scheme of life, the ideal that he holds forth must seem greatly over-strained.

Mill was, doubtless, able to state and to give reasons for his own view of the plan of the universe. He was also highly qualified to discuss particular portions of the groundwork of the prevailing creeds. I think, however, that he was too little versed in the writings of Theologians, to attack their doctrines with any effect. He absented himself during his whole life, except as a mere child, from religious services. He scarcely ever read a Theological book. He could not help knowing the main positions of Theology from our general literature. That, however, was scarcely enough for basing an attack upon Christianity along the whole line. Just about the time when the *Essays on Religion* appeared, Strauss's last book, called "*The Old Faith and the New*," was published in this country. Anyone reading it would, I think, be struck with its immense superiority to Mill's work, in all but the logic and metaphysics. Strauss speaks like a man thoroughly at home with his subject. He knows both sides as a life-study can enable one to know them. Mill, even supposing him to be in the right, would not be convincing. He may puzzle opponents, he may compel them to change front; still, he does not meet their difficulties, nor take account of what they feel to be their strength. He is not even well read in the sceptics that preceded him. If he had studied the whole cycle of Hume's argumentative treatises, so lucidly condensed by Mr. Leslie Stephen, he might have put his case on the negative side much better, while he would have been led to modify his constructive Theism.

It has been said by his opponents, with some show of plausibility, that Mill was at bottom a religious man. Setting aside special dogmas, and looking only to the cheering influence of religion on its most favourable side—an influence that may be exerted in a variety of ways—we may call his aspirations and

hopes for a bright future to the race, a religion of humanity. To hold up an ideal that involves no contradictions to our knowledge, to inspire and elate the mind, oppressed by the dulness and the hardships of the present life,—will be accepted by many as comfort of the spiritual kind, the real analogue of religion. And something of this effect is undoubtedly produced by Mill's later writings. With all this, however, the fact remains, that in everything characteristic of the creed of Christendom, he was a thorough-going negationist. He admitted, neither its truth nor its utility. His estimate of its best side is given in the remark to a friend under domestic sorrow—"To my mind the only permanent value of religion is in lightening the feeling of total separation which is so dreadful in a real grief".

## CHAPTER V.

### CHARACTER AND INFLUENCE.

ON Mill's general character, little remains for me to say. His writings, his career, his numerous critics, and last, but not least, his *Autobiography*, have sufficiently shown what manner of man he was. Any additional contribution is justifiable mainly on the supposition of enabling us better to seize the central features, and to make the whole more consistent throughout. There are, moreover, some anomalous passages in his life, upon which the last word has not yet been said.

Mill had, I believe, a very fine constitution physically. His father's brain was encased in an admirable framework. His muscle was good to the last; and his nutritive powers failed only in consequence of a strain that they should never have been subjected to. The nervous system was habitually kept at a high tension all through; this cannot be done for nothing.

The general cast of his mental powers was high in all the regions of mind. With a predominance of Intellect, he had great power of Will, and unusual depth of Feeling. He had pre-eminently the sanguine temperament. Whenever the general system was in working order, enjoyment was with him the natural result. He was, I think, born for a happy life, if he had got only tolerably fair play. It was not the fault of nature that he was so often in the depths: his power of recovery attests the vital force of the system.

There can be little hesitation as to the specialities of his Intellect. These were soon brought out by his early education, so far as books could do it. Every species of literature was

presented to his mind ; and, while he imbibed something of all, it soon became evident that science was his *forte*. He had an intellect for the abstract and the logical, out of all proportion to his hold of the concrete, and the poetical. His attempts at writing poetry could be little more than memory working upon the books that he had read, while their impression was fresh. He never attained to picturesqueness in the smallest degree ; he could no doubt have succeeded by set purpose, but he had other matters to attend to. He was but moderately endowed with the faculty of language as such ; the undoubted excellence of his mature style was arrived at by a series of efforts that may well be celebrated among triumphs of perseverance:

I think it perhaps a fortunate adjustment, to have possessed merely enough verbal power to give adequate expression to his thoughts, and not enough to make an artist to the extent occasionally realized even with great philosophers. That the thinking faculty, pure and simple, should have the predominating share of his intellectual force, was the condition of his peculiar subtlety as a thinker. Plato, Bacon, Berkeley, Hume, Ferrier, and others, paid for the goodness of their style, by some inferiority of their thoughts. Aristotle and Kant were perhaps at the other extreme ; their gifts of style were unequal to the adequate presentation of their ideas.

Mill had not much memory for detail of any kind. He had read a vast quantity of history, of fiction, of travels and incidents ; but you would not be aware of the fact from his conversation or from his writings. Neither in the illustration of doctrines, nor for figurative allusions, was he ready at reproducing facts in the concrete. He was, as a youth, well read in the Greek and Roman classics, but he scarcely ever made a happy original quotation.\* By express study, and frequent reference, he had amassed a store of facts bearing on political or sociological doctrines ; and these he had at full command.

The enormous devotion of his early years to book study interfered with his activity as an observer of facts at first hand,

whether in the physical, or in the mental world. He did, nevertheless, show a considerable wakefulness to what went on within his circle, yet with decided limitations. He could have imbibed physical facts with avidity, if his circumstances had been favourable; but his opportunities were very few. He was perhaps all the more disposed to notice mental and social facts; and it is wonderful how many of these he took hold of, in the remissions of book study. Of course, the larger mass of sociological details had to be gathered through books; yet a certain quantity of personal observation was needed as a basis for comprehending those that came by the other sources. His power of psychological observation was also good, and served him both as a theoretical psychologist, and as a practical philosopher, more especially in ethics, and in politics.

We come finally to the great distinguishing feature of such a mind as his: the rich storage of principles, doctrines, generalities of every degree, over several wide departments of knowledge. Principles had to be imbibed in copious draughts all through his education; the collision, combination, harmonizing, of these constitutes speculative insight, and conducts to original thinking. To read the productions of scientific men, to enter into the discussion of abstract themes with kindred minds, to excogitate and to reduce to writing new attempts at generalising from the facts,—such are the exercises of the discursive or scientific mind; and the natural avidity for those exercises is the test of the scientific endowment. Mill laid up in his capacious mind a variety of things; but, with all his getting, he got this special understanding—the understanding of principles. If you wanted, at any time, to commend yourself to his favourable regards, you had but to start a doctrinal discussion—to bring a new *logos* to his view.

With what success he plied his speculative faculty, what were the lines of his peculiar force, how far he rose above or fell below other speculators,—his books alone will testify; and all of them have been freely and almost exhaustively criticized for

those very questions. He is generally admitted to combine originality and clearness as only very few men have done. The attempts to undervalue his reputation on either head have met with little countenance. Tried by an absolute standard, he may be found defective at points ; but who is entitled to cast the first stone ? What other speculator from the beginning of philosophy has been equally original, and yet more uniformly precise, logical, and intelligible ? He could split hairs with any scholastic. He could discern flaws in the closest dialectic ; or turn the flank of the most circumspect disputant. Unless I am greatly deceived, time will not impair the fascination of that subtle intellect. The number of men that can handle such weapons can never be so great as to render his writings a superfluity ; and, even when his doctrines shall have been more highly worked up, by other thinkers, his manner of putting them will be looked back upon with curious interest.

He himself speaks with not unbecoming pride of his being always open to new views. To the last, he continued (he says) to learn and to unlearn. Of no man can this be stated absolutely. Yet Mill stood very high on the point of receptiveness. He did not shut up his mind to new impressions at forty. This, however, was merely another form of his anxiety to know whatever could be said by any one upon any question. Wishing always to do his very best, he neglected no available means. Before beginning to produce, he took ample time to absorb ; and, better than most men, hit the happy mean between haste and procrastination. He might have occasionally improved his work by a little more elaboration, but the loss in quantity would not have been compensated by the difference in quality.

He tells us, in connexion with his readings at Grote's house, that he " dated from these conversations my own real inauguration as an original and independent thinker. It was also through them that I acquired, or very much strengthened, a

mental habit to which I attribute all that I have ever done, or ever shall do, in speculation; that of never accepting half-solutions of difficulties as complete; never abandoning a puzzle, but again and again returning to it until it was cleared up; never allowing obscure corners of a subject to remain unexplored, because they did not appear important; never thinking that I perfectly understood any part of a subject until I understood the whole". This proceeds upon a large assumption, namely, that he always knew when he had attained to a complete solution; which, by the very nature of things, a man can seldom be quite sure of. I consider that he made one great stroke in his theory of the Syllogism; that it was more than a half solution, but yet was not the whole. So, in other things. We are rarely in a position to say that we have finished a problem; a succession of thinkers is required for every great advance; and whoever feels he can make one step need not wait till he can make all the rest. The only reason for hesitation is the uncertainty whether it is a step.

Another somewhat remarkable avowal in Mill's estimate of himself is contained in the long passage (*Autobiography*, p. 242), where he describes the influence of his wife upon his intellectual productiveness. "During the greater part of my literary life I have performed the office in relation to her, which from a rather early period I had considered as the most useful part that I was qualified to take in the domain of thought, that of an interpreter of original thinkers, and mediator between them and the public; for I had always a humble opinion of my own powers as an original thinker, except in abstract science (logic, metaphysics, and the theoretic principles of political economy and politics), but thought myself much superior to most of my contemporaries in willingness and ability to learn from everybody; as I found hardly any one who made such a point of examining what was said in defence of all opinions, however new or however old, in the conviction



that even if they were errors there might be a substratum of truth underneath them, and that in any case the discovery of what it was that made them plausible, would be a benefit to truth." The parenthesis is truly remarkable. A man is to think humbly of himself as an original thinker, provided his originality does not extend beyond Logic, Metaphysics, and Social Philosophy! How many more subjects would have been necessary to establish the claim? One would naturally suppose the point to be, how much did he do in these three domains? If he did everything that many of us are willing to give him credit for, he was an original thinker, and had few superiors, and not many equals. Willingness to learn is a very good thing, and was a part of his merits and a condition of his success; but it is not under all circumstances necessary to original thinking, and certainly would not of itself constitute originality. Unless there be decided innate force, an oversusceptibility to other people's views rather extinguishes than promotes invention. Had Mill been less disposed to learn and unlearn, he must, with his powers of mind, have been still an original thinker, although in a somewhat different way. He himself contributes a curious and interesting illustration of this very point. To my mind, the best piece of work that he ever did, was the Third Book of the *Logic*—Induction. Now, he tells us how fortunate he was in having finished this Book before reading Comte. That is to say, unassisted invention gave a better result than he would have attained by taking Comte into partnership from the beginning.

I must still farther qualify Mill's claim to receptiveness, by adverting again to what I consider his greatest theoretical errors as a scientific thinker. The first is—his doctrine of the natural equality of men. On this subject he was, in my opinion, blind to a whole region of facts. He inherited the mistake from his father, and could neither learn nor unlearn, in regard to it. The other error was perhaps less to be wondered at; I mean the disregard of the physical conditions of

our mental life. He might have educated himself out of this error, but he never did. I do not mean to say that he made no allowances for the physical element of our being ; my contention is, that he did not allow what every competent physiologist would now affirm to be the facts. I am afraid that, on both these errors, his feelings operated in giving his mind a bias. Whatever be the explanation, the effect was practically injurious.

In common with his father, Sir Walter Scott, and many others, he held that literature and philosophy should not be resorted to as a means of livelihood ; that people should derive their subsistence from some of the common vocations, and work at the higher themes in leisure hours. In a transition time, when a man of very original views in philosophy, or in sociology, has little chance of being listened to, it would be a mistake to depend for one's livelihood on writing books. The same objection does not apply to literature. Any man whose genius lies in style can make a living with comparative ease ; such a man would not better his condition by serving eight hours a-day in a counting house, and using the few remaining hours for literary work. Much of course depends on the occupation. Mill himself was nominally engaged six hours a-day ; but probably never gave more than the half of that time to his office routine. His two great works—the *Logic* and the *Political Economy*—were, I may say, written during his office hours. If he had been serving under a private master, he would not have been allowed to give up his business-time to extraneous work. Grote took a much better measure of the situation of a business man with erudite tastes. He found that while engaged in the work of the banking-house, he could not only pursue an extensive course of reading, but also work up essays on limited subjects ; yet when he began the Herculean labour of remodelling the entire *History of Greece*, he needed to have his whole time at his disposal, for twelve years.

It was remarked by De Morgan, that if Newton had remained at Cambridge, Mathematical Science might have been advanced a century. So, if the two Mills had been wholly exempted from official work, I have little doubt that all the speculative portions of Logic, Psychology, Politics, and Political Economy would have been put forward at least a generation. It so happened that their official duties opened up for them a sphere of public usefulness, and perhaps made them more practical in their views ; but, if they had been freed from all such labours, which perhaps others could have performed with the benefit of their lights, they would have given an impetus to speculation much beyond what we can now assign to them. By endeavouring to combine work for a livelihood with original research in philosophy, they brought upon themselves premature exhaustion, and vitiated their theories of life by shaping them under the perverting influence of shattered frames.

It is now time to turn to the Moral side of Mill's character. In what has been said on his intellect, moral and emotional elements have been assumed. The general impression made on the world by this part of his character has been highly favourable, on the whole. The generosity of his disposition manifested itself in many forms, and in high degrees ; while it also had its limitations.

The entire total of the emotional aspect of human character comprehends the whole circle of sensibilities, tastes, likings, and the way that those are modified by sympathy and the sense of duty. These are the motives to action, and their relative strength and preponderance can be best judged by action or conduct. Nevertheless, we must, as I conceive, take account of Activity as a separate and independent factor, and form some estimate of it on its account. I said, with reference to James Mill, that Intellect and Will were dominant over Feeling. Perhaps, of the son, we may say that there was a more nearly equal balance of all the three functions. The element of Will,

viewed apart from strength of motives—the pure spontaneous activity—was high in him too ; without that he could not have been such a persistent worker. At the same time, I am disposed to believe that his superabundant energy and activity had its largest source in the strength of his feelings. I once made the remark to him, regarding the sources of energy of character, that these were either natural fulness of vigour, or else excitement through stimulation. He said, quickly—"There : stimulation is what people never sufficiently allow for". It is usually easy enough to determine which of the two sources is operative in any marked case. The extreme dependence on stimulation is shown by the tendency to total quiescence when motives are wanting. Mill no doubt had a good, but not excessive, spontaneity ; and he had very large emotional susceptibilities that made him pre-eminently a worker. We are now to see what these were.

I am not singular in the opinion that in the so-called sensual feelings, he was below average ; that, in fact, he was not a good representative specimen of humanity in respect of these ; and scarcely did justice to them in his theories. He was not an ascetic in any sense ; he desired that every genuine susceptibility to pleasure should be turned to account, so far as it did not interfere with better pleasures ; but he made light of the difficulty of controlling the sexual appetite. He was exceedingly temperate as regarded the table ; there was nothing of the gourmand superadded to his healthy appetite. To have seen his simple breakfast at the India House, and to couple with that his entire abstinence from eating or drinking till his plain dinner at six o'clock,—would be decisive of his moderation in the pleasures of the palate.

Of his pleasures through the ear and the eye, not much can be said, until we take into account all the associated circumstances that render these two senses the avenues of the greater part of our chief gratifications. He had a musical ear, and gave some

attention to music in his early life. His ear for articulate cadence, elocution, and oratory, was in no wise distinguished. His colour-sense was not inconsiderable ; I have heard him say that, as a child, he had a very great pleasure in bright colours. I doubt, however, whether this susceptibility in him could really be called high ; it did not reach the point of the artist or picturesque poet ; if it had, his faculty for the abstract might have been submerged thereby. It was enough to make a perceptible element in his taste for scenery ; but, generally, he seemed to care very little for coloured effects.

We need to dive into the depths of our emotional nature, to reach the main sources of his pleasures and the springs of his conduct. The Tender Feeling must in him have been very considerable. He was, throughout, affectionate, genial, kindly. After his first great physical crisis, when his activity and ambition no longer sufficed for his support, he had recourse to his tender susceptibilities, which had previously perhaps been cramped and confined, although not wholly dormant. He had not the sociable feeling in the form of large indiscriminate outpourings, and boundless capability of fellowship. A certain kindness towards people in general, with a deep attachment to a few, was his peculiar mode ; this, probably, took much less out of him—drew less upon his mental resources as a whole, than the other form of sociability. He formed few close friendships, and was absorbed very early by his one great attachment.

The Tender feeling is necessarily an element in poetry, scenery, history, and indeed Fine Art generally. It is the beginning, but not the consummation, of our interest in mankind—the philanthropic impulse of great benefactors. Kindness to animals was a characteristic form in Mill, as it was in Bentham, who also had a great fund of natural tenderness, although wayward in manifesting it.

There is great difficulty in arriving at the precise degree of the fundamental or elementary emotions in almost any mind, still more in Mill, who, by training or culture, was a highly

complex product. The remark is applicable to the Tender feeling, viewed in its ultimate form ; and even more to the other great source of human emotion—the Malevolent or Irascible feeling. Unless conspicuously present, or conspicuously absent, the amount of the feeling in the elementary shape can with difficulty be estimated in a character notable for growth, and for complication of impulses. In Mill, all the coarse, crude forms of angry passion were entirely wanting. He never got into a rage. His pleasures of malevolence, so far as existing, were of a very refined nature. Only in the punishment of offenders against his fellow-men, did he indulge revengeful sentiment. He could, on occasions, be very severe in his judgments and denunciations ; but vulgar calumny, abuse, hatred for the mere sake of hatred, were completely crucified in him. He spent a large part of his life in polemics ; and his treatment of opponents was a model of the ethics of controversy. The delight in victory was with him a genial, hearty chuckle, and no more.

Taking emotional and sensuous elements together, we may recount his chief tastes and diversions, irrespective of sympathy proper, which adds a new and all-important fact of character.

The love of scenery, in connexion with touring excursions, was stimulated from an early date, and indulged in to the last. Whether he had a refined judgment of scenic effects, from an artist's point of view, I am unable to say. He did not become poetically inspired by nature, like Shelley or Wordsworth ; perhaps he enjoyed it none the less. He made little use of his varied travels by allusions, or figures in his composition. His enjoyment of the concrete did not render his style much less abstract than it would have been although, like Kant, he had never left home.

His taste for plant-collecting began in France, under George Bentham, and was continued through life. It served him in those limited excursions, in the neighbourhood of London, that he habitually kept up for the needs of recreation. I may be mistaken, but it seems to me, that this taste belongs to a

character joyous by nature, and therefore easily amused ; or perhaps nothing more stimulating is to be had. It no doubt adds an interest to pedestrian exercise. The mental effort is very small ; the scientific outcome still smaller. Of Botany as a science, Mill knew very little ; indeed, when he began, there was not much to be known, beyond the description of plants in detail, and the classifications of Linnæus and Jussieu. Plant-hunting was to him what sports are to other persons. I doubt whether, under any circumstances, he could have brought himself to be a sportsman. Hunting and shooting would, I am pretty certain, have been abhorrent to him ; and, while his excursions often brought him into opportunities for fishing, he never availed himself of these. The chase for plants was all that he desired. In my chapter, in *The Emotions and the Will*, on Plot-Interest, I endeavoured to describe the situation of pursuit in the sports of the field. When Mill revised the MS. of the work, before publication, he added the note, which is given in connexion with the passage—"All this eminently applies to the botanist".

Reverting to his interest in natural scenery, we may recall his great anxiety lest the enclosure of Commons should go the length of effacing natural beauties and diminishing the scope of the picturesque tourist. This was one of the "five points" of his charter in reforming the Land Laws. He was also very much concerned (and so was his father) at the possible havoc that the railways might make in the beauties of our rural districts. Thus, writing in 1836, on the measures of Reform then pending, he adverts to the progress of the railways, and observes—"it is far from desirable that this island, the most beautiful portion perhaps of the earth's surface for its size, should be levelled and torn up in a hundred unnecessary directions by these deformities". And again :—"In the choice of a line it is disgraceful that not one thought should be bestowed upon the character of the natural scenery which is threatened with destruction. It is highly desirable that there

should be a railway to Brighton ; scarcely any one which could be constructed would be convenient to such a multitude of persons, or is likely to be so profitable to the subscribers. But of the five rival lines which have been proposed, two, if not three, and particularly Stephenson's, would, to a great degree, annihilate the peculiar beauty of a spot unrivalled in the world for the exquisiteness, combined with the accessibility, of its natural scenery : the vale of Norbury, at the foot of Box Hill. Yet into the head of hardly one Member of Parliament does it appear to have come, that this consideration ought to weigh one feather, even on the question of preference among a variety of lines, in other respects probably about equal in their advantages. Yet these men have voted £11,000 of the people's money for two Correggios, and many thousands more for a building to put them in, and will hold forth by the hour about encouraging the fine arts, and refining the minds of the people by the pleasures of imagination. We see, by this contrast, what amount of real taste, real wish to cultivate in the people the capacity of enjoying beauty, or real capacity for enjoying it themselves, is concerned in this profuse expenditure of public money ; although two-thirds of these men would shout in chorus against 'political economists' and 'utilitarians' for having no imagination, and despising that faculty in others. The truth is, that in this country the sense of beauty, as a national characteristic, scarcely exists. What is mistaken for it is the taste for costliness, and for whatever has a costly appearance."

The passage is a long one ; but it illustrates Mill in other points besides his love of scenery. I cannot help thinking that his sweeping condemnation of Members of Parliament generally is a little overdone.

One other anecdote is worth preserving. A number of years ago, Piccadilly was widened by taking a slice off the Green Park. A row of trees was included in the addition ; and, in all probability, these would have been cut down. Lord Lincoln



was then chief Commissioner of Woods and Forests. Mill intervened at the right moment, and, I believe by the mediation of Charles Buller, induced Lord Lincoln to preserve the row as they now remain at the street edge of the foot pavement.

Setting aside for the moment the interests that grew out of his intellectual capabilities and work generally, we may remark upon his æsthetic sensibilities as a whole. His earliest favourite books were those relating to characters renowned for heroism and strength. I do not think that this persisted through life to a marked degree. He qualified his admiration of strength with the use made of it; and thoroughly concurred in Grote's estimate of Alexander the Great. Caesarism was his abomination. Pericles, I should suppose, was his greatest hero or antiquity. Greece was the home of his affections in the ancient world.

His poetic tastes, as they revealed themselves after his great crisis, are beyond my powers to analyze or explain. Soon after I knew him, he endeavoured to make me interested in Wordsworth, and pointed out the poems that I should begin with; but his efforts were for the time unsuccessful. He seemed to look upon Poetry as a Religion, or rather as Religion and Philosophy in one. He took strongly to Tennyson, and was able to discern at once those beauties that the general world have since agreed upon; but his obtuseness to Shakespeare would suggest doubts as to his feeling for poetic effects of the kind that represent pure poetry, apart from either religion or philosophy. I never could make sure whether the highest genius of style attracted him, without pointing some moral, or lending itself to a truth; yet, I found from one of his letters at a late period of his life, that he continued to read Carlyle with pleasure, after ceasing to care anything for his doctrinal views. His thorough mastery of the French language enabled him to enjoy the masterpieces of French prose. At an early stage, he read the French wits for improving his style; and it has seemed to me a curious slip of memory that he never mentions, in the *Autobiography*, Paul

Louis Courier, whose witty turns he often quoted with gusto. He was charmed with George Sand, as a matter of course ; and the rhetoric of Victor Hugo was not strong for him. Yet his doctrinal leanings came out even with the French romancists. I can remember going with him to Baillière's shop in Regent Street, after the publication of the *Political Economy*, to direct copies to be sent to Eugène Sue and George Sand ; his reason being, that their novels were impregnated with social theories ; and these he partly sympathised with, and partly desired to rectify.

We cannot proceed farther without including the Sympathetic element in character, which should be viewed apart from mere emotion ; it being so easily confounded with tender feeling. There is in every one a certain strength of the sympathetic disposition, and a certain limited number of channels wherein it flows. What actually comes to the surface is a result of the conflict between the natural force of sympathy (a hypothetical quantity) and the purely egotistic impulses. Now there is no doubt that Mill had a highly sympathetic nature, but it had very decided limits. It must have operated at once as a restraint on the growth of egotism, a quality very little pronounced in his character. Placed early in life in an occupation which soon gave him comparative opulence, he was rendered content as far as regarded means, and thus removed from the struggle for subsistence. He had made up his mind that his writings would not bring him money, and for a time not even fame ; so that he was more than satisfied with his success as an author. He was absolutely without any feeling of rivalry, or jealousy of other men's success. His originality and fecundity of ideas would not have exempted him so completely from the dread of being anticipated in his discoveries, or balked of his credit, had he not possessed a fund of generosity of character, for which sympathy is another name. He poured himself out in conversation, and his ideas were caught up and used, with

or without acknowledgment ; but he never disturbed himself one way or other. Of this part of his character, I can speak absolutely, and not by a figure of speech, under which we may turn a part into a whole. In other virtues, he had his limits, but in this he had none.

What was the extent of his generosity in money gifts and assistance, I cannot tell. It may have been considerable, but would never have been known from himself ; the Comte correspondence tells us what he was prepared to do for Comte, at the worst conceivable moment for his own circumstances. But cases are known where he came to the relief of authors in their difficulties with publishers. I have heard him say generally that he considered it a very good way of helping a young author, to offer to bear the risk of the publisher's loss, in the first instance. Mr. Herbert Spencer mentions an offer of this kind made to him, at a time when he was on the eve of suspending the publication in numbers of his great serial work. He did something of the same kind for me, when Parker wished to delay publishing my volume—*The Emotions and the Will*. On condition of immediate publication, he offered a guarantee against loss, which had the effect without being called into play.

Another point of conduct where his merits were absolute, had reference to fidelity in engagements, punctuality, and thorough reliableness, when he pledged his word. He never, to my knowledge, failed in any matter where people counted on him. I remember his having an important communication to make, by a given day, to the Women's Suffrage Committee. To obviate the possibility of miscarriage, he despatched a duplicate by a different channel.

Continuing our criticism of the generous or altruistic side of Mill's nature, we may single out his treatment of opponents in his life-long controversial warfare. There are very few cases indeed, where he failed to put forward the whole strength of the arguments that he was contending against ; and his manner

with irritating controversialists is exactly stated in the preface to his Discussions, thus—

“Only a small number of these papers are controversial, and in but two [the Sedgwick and Whewell articles] am I aware of anything like asperity of tone. In both these cases some degree of it was justifiable, as I was defending maligned doctrines or individuals, against unmerited onslaughts by persons who, on the evidence afforded by themselves, were, in no respect entitled to sit in judgment on them: and the same misrepresentations have been and still are so incessantly reiterated by a crowd of writers, that emphatic protests against them are as needful now as when the papers in question were first written. My adversaries, too, were men not themselves remarkable for mild treatment of opponents, and quite capable of holding their own in any form of reviewing or pamphleteering polemics. I believe that I have in no case fought with other than fair weapons, and any strong expressions which I have used were extorted from me by my subject, not prompted by the smallest feeling of personal ill-will towards my antagonists.”

We must emphatically claim for him the merit of being, throughout his whole life, a seeker for truth. To be found in error was no affront to his *amour propre*. He was not afraid to encounter an able opponent; simply because to change an opinion, under the force of new facts or reasonings, was not only not repugnant, it was welcome. His opinions were in marked opposition to his worldly interests, as his father's had been. He did not publicly avow his dissent from the orthodoxy of the country; but it was well enough known in a very wide private circle, and could be inferred from his published writings. He had long determined to throw off the mask entirely, when the time should be ripe for it. He intended, he said, to expend all the reputation he got by his books in upholding unpopular opinions; and was prevented from an earlier avowal of these, solely by the circumstance that the silent course of opinion was serving

the interests of progress better than any violent shock, on his part would have done. Courage was a quality he was never deficient in ; the reason being that he was ready to incur the sacrifice that it necessarily involves. Perhaps, with one exception, the most signal example of his courage was the composition of the Essay on *Theism*. It was a more extraordinary revelation of departure from opinions that he had been known to maintain, than had been his Bentham and Coleridge articles ; and, while it might be grateful to some of his friends and the opposite to others, it was certainly hard to reconcile with his former self.

These aspects of his character properly connect themselves with the great central peculiarity of an ardent public spirit, contracted under his father's influence and fostered by his own natural dispositions. He is admitted on all hands to have had a pure and genuine love of his kind. It was the key to his life-long exertions ; and had the very minimum of intermixture with purely personal ambition. He cordially sympathized with every form of improvement ; and did whatever lay in him to aid the contrivers of new and beneficial schemes. He was a strong supporter of Mr. Chadwick's Poor Law and Sanitary legislation. He was quite exultant when the Peel Government of 1841 acquiesced in the Penny Postage, which Peel had at first opposed. He gave a willing hand to any plausible projects of improvement. His taking up of Hare's scheme of representation was a notable illustration of his readiness to embrace proposals that he had no hand in suggesting. If anything, he was perhaps too eager and hopeful, and prone to be led away by fair promises ; his natural temperament was confiding rather than sceptical ; when he had not knowledge enough to check what other people said, he was ready to take them at their word.

It is, then, to his zeal for the welfare of mankind, that we must refer the direction of his pursuits and the intensity of his

labours. He knew what his own capabilities were, and placed them freely at the service of his fellow-beings, according to his best lights. His tastes, pleasures, or likings, must now be reviewed, with the addition of the sympathetic or altruistic element. We must add, to the points already named, the active portion of his character—the delight in the exertion of his faculties, and in the prospect of public good accruing therefrom. He had, to begin with, a pleasure, of quite unusual amount, in the putting forth of his speculative powers, both in conversation and in writing. Considering the high standard of excellence he had achieved, not simply in the invention, but also in the expression and elaboration, of his ideas, I am astonished at his avowals of sustained pleasure in writing. He used to say that the beginning of a work cost him a good deal of labour and pain ; but when he was fairly launched, his enjoyment of the task predominated over the toil. His severe early training perhaps contributed to this rare and enviable endowment. He, more than once, to my recollection, after two or three months' touring in summer, retired to Avignon, to have a *holiday of work* ; namely, to write a book.

Such was the egoistic side of his work, and was of course somewhat strongly expressed. To account fully for his many labours, we must also view the altruistic side. This was the fixed idea that he came into the world not to serve himself, but to serve his race ; and that idleness, except as the condition of renewed labour, was culpable and base. His favourite text was—The night cometh when no man can work. Here is an interesting remark in a letter to Thornton, in 1860. Thornton had been to see Oxford, and Mill recalls his own visit twenty years before, and says—"In that same holiday I completed the first draft of my *Logic*, and had, for the first time, the feeling that I had now actually accomplished something—that one certain portion of my life's work was done". I understand that, on the night of his death, when he was informed that he would not recover, he calmly said—"My work is done".

Although his services to the public were spread over his life, in alternation with tracts of recreation and pure enjoyment, and although they were, to an unusual degree, pleasurable in the performance, yet I do not doubt that he could, if necessary, have given still greater proofs of his disinterestedness and zeal for humanity. He could have embraced a much more self-denying career; like Howard, in Bentham's felicitous eulogy, he might have "died a martyr, after having lived an apostle".

I must now endeavour to point out what were the more conspicuous shortcomings of the generous or sympathetic side of Mill's nature. Everyone's sympathies come to a stop somewhere; and a character is not completely stated without assigning the limit. I am not speaking of the case where antagonism is a necessary consequence of attachment; we must be enemies to those that make enemies of us. I allude to cases where I believe Mill's sentiments may be fairly considered as excessive and uncalled for. Had his judgment of the circumstances been perfect, the severity might have been right; but he at times assumed too readily his own infallibility, and condemned people accordingly. In the *Autobiography*, he recants the harshness of his judgment upon the radical leaders of the years following the Reform Bill; yet he does not apologize for such language as the following. I quote from the *Life of Fonblanque*:—

"In 1838 these differences [among the Radicals] appear to have become more serious; and we find Fonblanque reproaching Mill with identifying himself with the "Grote conclave" and the "philosophical Radicals," and Mill, in defending himself against the charge, repudiating the doctrines of Grote and his coterie, as "persons, whom I have nothing to do with, and to whose opinions you are far more nearly allied than I am. . . . There may be such a conclave, but I know nothing of it, for I have never been within the door of Grote's house in Eccleston Street, and have been for the last few years

completely estranged from that household. Immediately after Lord J. Russell's declaration I tried to rouse them, and went to a meeting of most of the leading parliamentary Radicals at Molesworth's, from which I came away, they thinking me, I fancy, almost mad, and I thinking them craven. I do not except Grote, or Warburton, or Hume, all of whom were there. I except none but Molesworth and Leader, two raw boys; and I assure you, when I told them what I thought should be done by men of spirit and real practicalness of character, I had perfect ground for feeling well assured that they would not do it."

I think his habitual way of speaking of England, the English people, English society, as compared with other nations, was positively unjust, and served no good end. This remark occurs in the article on *The Claims of Labour*. "It is a just charge against the English nation, considered generally, that they do not know how to be kind, courteous, and considerate of the feelings of others. It is their character throughout Europe. They have much to learn from other nations in the arts not only of being serviceable and amiable with grace, but of being so at all." Now, it seems to me, that, with the standard of moral perfection in our view, a great deal may be said against our country; but, in the comparison with France, Germany, Italy, Spain, and the rest, I cannot admit the justice of such a strain of remark. Mill had a great partiality for France, until the usurpation of Louis Napoleon; and his opinion of England was correspondingly low. His criticism of public men and public events seemed to me to err very often on the side of severity. His denunciation of our age in particular, as compared with former ages—"this is an age of weak convictions, &c."—is, I think, considerably misplaced, and savours too much of Carlyle. There may have been ages with more intensity in special directions—as religious fervour, for example—but I doubt if any century ever took upon itself the redress of so many wrongs, left untouched for ages, as ours has done.



His remarks (*Autobiography*, p. 227) as to his withdrawal from general society, at the close of the political decade, 1830-40, have naturally exposed him to pretty sharp criticism. "General society, as now carried on in England, is so insipid an affair, even to the persons who make it what it is, that it is kept up for any reason rather than the pleasure it affords"; and so on. It is difficult to recognize the appositeness of the censure. General society is a very large phrase; it comprises coteries where such a man as Mill would be out of his element, and others where he might discuss any subject, and utter any opinions that he pleased. It was no doubt a saving of time to renounce going into society; but it was accompanied with some loss, for which he makes no allowance. There were other societies, besides the Political Economy Club, where he could have occasionally gone with considerable profit. Before hazarding all the opinions contained in the *Essays on Religion*, he would have done well to have discussed them with a variety of persons whom it would not be difficult to name.

In expressing himself on matters that he very much disliked, he was at times exceedingly sharp and plain-spoken. One example is given by Mr. Holyoake, in connexion with the population question. In other cases, I have known him very unceremonious in his expressions of disapproval. I never had any occasion to complain of his manner, so far as I myself was concerned; he was, on the contrary, unremittingly courteous as well as kind. But the things that he said to other people, made one feel that he might take a sudden and inexplicable turn. Then, it was a theory of his to be more frank and outspoken than the common notions of good-breeding would allow; with this qualification, that he expected to be treated to the same frankness in return. We must carefully exonerate him from rudeness of language; his refinement and tact were perfect; he could clothe a very severe remark in an unexceptionable form. For many years, he was wont to encourage young men to send him their productions for criticism and

advice. He took a great deal of trouble in recommending such articles to editors ; and thus helped to start not a few men in a literary career. It was, I think, G. H. Lewes that mentioned sending something to him, as he had often done before ; the paper was abruptly returned without explanation.

It will no doubt go down to posterity as one of his characteristic traits, that he refused to see our two Royal Princesses (the Crown Princess of Prussia and the Princess Alice), who earnestly sought an interview, and proposed to go to Avignon for the purpose. We cannot attribute the refusal to haughtiness or pride, which was entirely foreign to him ; but, in the absence of the real explanation, I prefer to give no opinion on what would seem an uncalled-for discourtesy.

I am bound to take notice of what he calls the greatest friendship of his life ; his relation to Mrs. Taylor, which began in 1831, and led to his marrying her, twenty years later, when her first husband was dead.

When I went to London in 1842, the friendship had lasted eleven years. It was the familiar talk of all the circle. On his first acquaintance with Mrs. Taylor, he introduced her to some of his friends, but chiefly, I think, to Carlyle, whom she continued to visit for a considerable time, being, as we are told, one of his great admirers. Mill and she attended together Carlyle's courses of Lectures.

The connexion soon became known to his father, who taxed him with being in love with another man's wife. He replied, he had no other feeling towards her, than he would have towards an equally able man. The answer was unsatisfactory, but final. His father could do no more, but he expressed to several of his friends, his strong disapproval of the affair. Some attempts at remonstrance were made by others, but with no better result. Nothing, it was said, drew down his resentment more surely than any interference, or any remarks that came to his ear, on the subject. When I first knew him, he

was completely alienated from Mrs. Grote, while keeping up his intercourse with Grote himself; and as she was not the person to have an opinion without freely expressing it, I inferred that the estrangement had some reference to Mrs. Taylor. Mrs. Austin, too, I was told, came in for the cold shoulder; and Harriet Martineau, who had special opportunities of knowing the history of the connexion, and also spoke her mind freely concerning it, was understood to be still more decisively under the ban.\*

The upshot was that everyone of Mill's friends abstained from all allusions to Mrs. Taylor, and he was equally reticent on his side. Her name was never mentioned in his own family. His manner of intercourse with her is stated generally in the *Autobiography*, p. 229. In the summer of 1842, and for some of the following summers, I cannot say how many, I knew that he went to dine with her at her husband's house, in Kent Terrace, Regent's Park, about twice a-week (Mr. Taylor himself dining out); there were certain days that he was not available for a walk with me from the India House to Kensington. Occasionally, I happened to fall upon one of these days, and we went together only as far as the Bank, where he took the omnibus for the Regent's Park. At a later period, she was living mostly in the country, in a lodging (I think at Walthamstow) with her daughter, then very young. I believe that, at this time, she was suffering from spinal injury, and had to remain on the sofa for several years. She ultimately recovered the power of walking, but was delicate in other ways, being liable to attacks

\* Miss Martineau was present at the dinner party, in Mr. Taylor's house, in the city, at which Mill first met his wife. She related freely the whole of the circumstances, but I see no good in repeating them. Mr. Taylor was a member of the Unitarian body, and attended the chapel of W. J. Fox. Mrs. Taylor made Fox her confidant as to her want of sympathy from her husband (to whom she had been married at 18), and Fox suggested her becoming acquainted with Mill. Fox was one of the dinner-party. Roebuck also was present.

Mr. Taylor was, I understand, a Druggist, or Wholesale Druggist, in Mark Lane; his eldest son still carries on the business.

of hemorrhage from the lungs. During all the years of her marriage with Mill, she was properly described as an invalid.

The behaviour of her husband was, in the circumstances, exceedingly generous. After some remonstrances and explanations, he accepted the situation; a *modus vivendi*, as the phrase is, was agreed upon; and he was a consenting party to the intercourse that Mill describes. No doubt he and his children were sufferers by the diversion of his wife's thoughts and attentions; to what extent I will not presume to say.

The first occasion when Mill gave publicity to his admiration for Mrs. Taylor was in bringing out his Political Economy. In a certain number of copies, stamped "Gift copies," he introduced a dedication, in the following terms, as near as I can remember:—"To Mrs. John Taylor, who, of all persons known

\* A Divorce law, such as exists in Germany, and in some of the United States of America, would have been the best thing for all parties in this anomalous situation. Mill repeatedly exposed the weakness of the common arguments for indissoluble marriage, yet never advocated divorce under any conditions. Mr. Morley details a conversation with him, not long before his death, during which he touched upon this question, and said he would not have it raised until women had an equal voice with men in deciding it. I am afraid if it can lie over till that time, it will lie over a good while longer.

Bentham argues the question with his usual incisiveness; and his arguments are rarely met. An attempt, on the part of Whewell, to meet them, is thus disposed of by Mill himself:—

"Finally, Dr. Whewell says—'No good rule can be established on this subject without regarding the marriage union in a moral point of view; without assuming it as one great object of the law to elevate and purify men's idea of marriage: to lead them to look upon it as an entire union of interests and feelings, enjoyments and hopes, between the two parties'. We cannot agree in the doctrine that it should be an object of the law to 'lead men to look upon' marriage as being what it is not. Neither Bentham nor any one who thinks with him would deny that this entire union is the completest ideal of marriage; but it is bad philosophy to speak of a relation as if it always *was* the best thing that it possibly can be, and then infer that when it is notoriously not such, as in an immense majority of cases, and even when it is the extreme contrary, as in a considerable minority, it should nevertheless be treated exactly as if the fact corresponded with the theory. The liberty of divorce is contended for, because marriages are not what Dr. Whewell says they should be looked upon as being; because a choice made by an inexperienced person, and not allowed to be corrected, cannot, except by a happy accident, realise the conditions essential to this complete union."

to the author, is the most highly qualified, either to originate or to appreciate speculation on social advancement, this work is, with the highest respect and esteem, dedicated." He tells us that he wished to prefix this dedication to the published copies, but she disliked it.

Although, like everybody else, I had always avoided any allusion to Mrs. Taylor, I thought that he had now, of his own accord, introduced her name to his friends, and that to continue ignoring her existence was mistaken delicacy. I accordingly did venture to speak of her, and drew him out into a eulogy of her extraordinary powers. The phrase that chiefly survives in my memory is—she was an "apostle of progress". He spoke with great vehemence, and seemed not at all to dislike my broaching the subject. I believe no one else made the same use of the occasion; and I was considered to have done a very rash thing. I confess, I did not feel disposed to renew the reference very often: I alluded to her again only two or three times, and not till after their marriage. He asked no one, so far as I know, to visit her. Grote would have most cordially paid his respects to her, had he known it would have been agreeable; but he did not receive any intimation to that effect, and never saw her either before or after her marriage to Mill. Mrs. Grote had, on one occasion, at Mill's desire, taken her to the House of Commons to hear Grote speak.

Her two sons were friends of Mill's mother and family. I have repeatedly met them at the house. George Mill used to visit at their father's house, and knew their mother well. Of course, he often spoke of her to his companions, myself among the rest. Although a young man, he was not incapable of forming a judgment of people; and his observation always was, that Mrs. Taylor was a clever and remarkable woman, but nothing like what John took her to be.\*

\* Mill for a time (I suppose during the thirties) went to the receptions of Lady Harriet Baring, afterwards the first Lady Ashburton, whom he was said

He did not again, in her lifetime, bring her name prominently forward. It was after her death that he made her the subject of his extraordinary encomiums. The first occasion was in the dedication to the *Liberty*; this was followed, soon after, by the note in the second volume of the *Dissertations*, in connexion with her own article on the Enfranchisement of Women. Grote used to say—"only John Mill's reputation could survive such displays". Finally, came the *Autobiography*.\*

The love attachment between the sexes, in its extreme instances, is hardly reducible to any of the laws of human feeling in general. Its occasions and causes seem often out of all proportion to the effects. On what seems a very minute physical feature often turns an overpowering preference for one individual, a fascination stronger than anything that life affords. The description given by Heine is a typical instance:—"Her voice was delightful to me beyond all that I had ever heard. Yes: or have since heard; or ever shall hear." The effects of personal beauty upon human beings generally are far from being accounted for; the special likings for individuals are still less explicable. A few circumstances have been noticed as more or less prevailing in their sweep. The influence of contrasted peculiarities is perhaps the most notable; the liking of fair for dark complexions is very

to admire very much. He was introduced, I believe, by Charles Buller, a great favourite with her ladyship, herself remarkable for wit and brilliancy. He broke off this connexion abruptly; various reasons were afloat. Of course, Mrs. Taylor's name came up in the explanation.

\* The inscription on the tomb at Avignon is worded thus:—"Her great and loving heart, her noble soul, her clear, powerful, original, and comprehensive intellect, made her the guide and support, the instructor in wisdom, and the example in goodness, as she was the sole earthly delight of those who had the happiness to belong to her. As earnest for all public good as she was generous and devoted to all who surrounded her, her influence has been felt in many of the greatest improvements of the age, and will be in those still to come. Were there even a few hearts and intellects like hers, this earth would already become the hoped-for heaven." The wordiness of the composition is more suggestive of intense feeling than a polished elegy could have been.

apparent in mixed races like ourselves. In mental peculiarities, contrast also dominates in many subtle forms which I need not here dilate upon.

Mill would fain make us believe that the attachment in his case was based altogether on mental superiority—intellectual and moral. The influence of beauty in general, the special attraction of fair for dark, of tall for short, and other such influences,—he would have us leave entirely out of the account. Hard thinkers are most often charmed, not by other thinkers, but by minds of the more concrete and artistic mould. He would have perhaps allowed something of this sort, in his case, with the condition, that the artistic element was merely one of the aspects of a genius that took the first rank in every form of intellectual greatness.

The influence of contrast in producing the love of attachment must be so expressed as not to exclude sympathy or agreement in opinions, objects, and aspirations; which is one great cause of individual likings. This is a broad general fact, but does not go far towards explaining the select overpowering attachments. Mill tells us that his opinions on the complete equality between the sexes in all legal, political, social, and domestic relations were, he believed, more than anything else, the originating cause of the interest his wife felt in him. This is so far in conformity with the general principle; yet does not help us very much.

His hyperbolic language of unbounded laudation, which has been the cause of so much wonderment, can be somewhat checked by the details that he himself supplies. His accustomed precision does not desert him in regard to these; and we are enabled to form a probable estimate of what his wife really was to him.

In the first place, he tells us that the *Logic* owed nothing to her, except the minutiae of composition. Then as to the *Political Economy*, the purely scientific part he did not learn from her. What was entirely her work was the chapter en-

titled, "The Probable Future of the Labouring Classes," which, he says, has had a greater influence on opinion than all the rest put together. It was "chiefly her influence that gave the book that general tone by which it is distinguished from all previous expositions of Political Economy that had any pretensions to be scientific, and which has made it so useful in conciliating minds which these previous expositions had repelled". Again: "What was abstract and purely scientific was generally mine; the properly human element came from her; in all that concerned the application of philosophy to the exigencies of human society and progress, I was her pupil, alike in boldness of speculation and cautiousness of practical judgment".

He avows an intensity of passionate regard that could hardly subsist in any mind, without yielding the known consequences of excessive emotion. Difficult as it often is to bring under general laws of the mind the capricious origin of strong attachments, there is much more of law and uniformity in the results. If one particular attachment of the mind is twenty times as strong as the strongest of the others, and ten times as strong as all the rest of the regards put together, the effects may be calculated to a certainty. The minor feelings will receive their limited share of consideration; only, they must never enter into rivalry with the master passion; they may be easily put aside altogether for a time. Mill, in writing to his brother James, after his bereavement, says:—"When I was happy, I never went after any one; those that wanted me might come to me". After his grief had subsided, he began to seek his friends; he went to their houses, and received them

\* Carlyle, when led to refer to Mrs. Taylor, used to describe her in his own way. The phrase that he most usually employed was, I think, "veevied"; which the reader may compare with the terms that he used in his supercilious mood when he penned the "Reminiscences". John Mill himself, in what he said to me about her, noted specially her great power of seizing and retaining pictorial or concrete aspects; indicating that she had the groundwork of an imaginative intellect.



into his ; and was in his last years, for a few months in the twelve, a sociable man.

The chapter above referred to, as I understand it, is occupied with an account of the altered position of the working classes with reference to those above, as no longer a relation of dependence and protection. "We have entered into a state of civilisation in which the bond that attaches human beings to one another, must be disinterested admiration and sympathy for personal qualities, or gratitude for unselfish services, and not the emotions of protectors towards dependents, or of dependents towards protectors. The arrangements of society are now such that no man or woman who either possesses or is able to earn a livelihood requires any other protection than that of the law. This being the case, it argues great ignorance of human nature to continue taking for granted that relations founded on protection must always subsist, and not to see that the assumption of the part of protector, and of the power which belongs to it, without any of the necessities which justify it, must engender feelings opposite to loyalty." This is the same thesis so well worked out in the article on *Claims of Labour*. The third paragraph contains an emphatic assertion of the necessity of opening up industrial occupation freely to both sexes. The second half of the chapter discusses Co-operation, as a means of raising the condition of the labourer.

All this might certainly have grown out of Mill's own independent studies ; but we must take his word for it when he says that his conversations with Mrs. Taylor helped him in giving it "form and pressure".

He makes no special claim for her in regard to his Political writings ; of which the *Representative Government* (composed soon after her death) may be considered as the sum. He mentions merely that she preceded him in turning against the Ballot.

The *Liberty* was the chief production of his married life : and in it, she bore a considerable part. His own antecedents

had prepared him for writing a defence of Free-thought that would be sure to take rank with the first expositions of the subject. The book has unsurpassed excellencies, and, as I think, some defects. How far these are to be partitioned between the two co-operating minds, there is probably no means of discovering.

The *Subjection of Woman* is said to have been the result of their joint discussions for many years; Miss Helen Taylor assisting in the composition. No doubt this was his wife's subject by pre-eminence; it is the only subject that she actually wrote upon with her own pen. Her influence upon Mill, and upon the world through him, lay unmistakably here. Apart from her, he probably might have continued to hold his original opinions as to the equality of the sexes, but he might not have devoted so much of his life to the energetic advocacy of them.

If Mill had been content with putting forward these explanations as to his wife's concurrence in his labours, the world would have accepted them as given, and would have accorded to her a reputation corresponding. Unfortunately for both, he outraged all reasonable credibility in describing her matchless genius, without being able to supply any corroborating testimony. Such a state of subjection to the will of another, as he candidly avows, and glories in, cannot be received as a right state of things. It violates our sense of due proportion, in the relationship of human beings. Still, it is but the natural outcome of his extraordinary hallucination as to the personal qualities of his wife. The influence of overweening passion is most conspicuous and irrefragable in this particular. He does not tell us that he set aside other interests on her account; what he does tell shows that his mode of estimating her must have been partial to a degree that will create lasting astonishment. The remark was made by Mr. Goldwin Smith, that Mill's hallucination as to his wife's genius deprived him of all authority wherever that came in; but he was still to be treated with the deference due to his great powers, where that did not

come in. It is fortunate for his fame and influence, that so very much of what he did was entirely withdrawn from possible bias on her account.

It is a painful fact that his marriage was the occasion of his utter estrangement from his mother and sisters. He had been the joy and the light of the house, while he lived with the family.\* Some very slight incident was laid hold of as a ground of offence, and all communication was thenceforth broken off, excepting on essential matters of business. But for the redeeming circumstance of his coming forward, with his natural generosity, when misfortune arose, the relations with his own family after his marriage would have seriously shaded his biography. I speak, of course, from one-sided knowledge, which is never held conclusive; but all parties concerned have been under powerful motives to put the best possible construction upon his conduct.

Various views have been given as to the nature of the fascination that first drew him to Mrs. Taylor. One view is simply that he fell, as philosopher and peasant alike may fall, under the witchery of the other sex. To complete the explanation, it is added, that his severe intellectual strain prepared him for a reaction on the emotional side, and that the grand passion came in happily to fill up an aching void in his nature. His finding one that could be an intellectual companion entered into the charm.

Now this may be all very true, but we do not know it to be the truth. The fact must be faced that, on his own showing, she was an intellectual companion, only in a very small portion of his range of studies. He had no sympathy or help from her during perhaps the most intense and exciting work that he ever went through—the composition of the *Logic*. Their great mutual sympathy grew up on her strong practical views on a certain limited number of topics, on which he grew more and more ardent, and magnified at the expense of his whole speculative range in *Logic*, *Metaphysics*, and *Politics*.

The more common way of representing Mrs. Mill's ascendancy, is to say that she imbibed all his views, and gave them back in her own form, by which he was flattered and pleased. This is merest conjecture: the authors of the surmise never saw Mill and his wife together; and, in all probability, misconceived the whole situation. As I have just remarked, it was comparatively few of his ideas that she could render back in an intelligent form. But farther, it is not the true account of Mill to say that he was pleased by the simple giving back of his own thoughts. Of course, this would have been preferable to contradicting him at every point, or to gross misconception of his meaning. Judging from my own experience of him, I should say that what he liked was to have his own faculties set in motion, so as to evolve new thoughts and new aspects of old thoughts. This might be done better by intelligently controverting his views than by merely reproducing them in different language. And I have no doubt that his wife did operate upon him in this very form. But the ways of inducing him to exert his powers in talk, which was a standing pleasure of his life, cannot be summed up under either agreement or opposition. It supposed independent resources on the part of his fellow-talker, and a good mutual understanding as to the proper conditions of the problem at issue.

Mill was not such an egotist as to be captivated by the echo of his own opinions. Something of the kind might have applied to Milton, if he had been fortunate enough to find a suitable mate; or to the affection of Auguste Comte for Clotilde de Vaux. The men that Mill professed most attachment to were very much at variance with him even in fundamental questions. It is enough to refer to what he says of John Sterling, who retained to the last the *à priori* way of looking at things. I saw him and Sterling together, once or twice, and could easily divine the cause of their mutual liking. Sterling is known from Carlyle's portrait of him: he was exceedingly genial in disposition and manner, and overflowed in suggestive

talk, which Mill took up and improved upon in his own way. In like manner, one of Mill's chief friendships in later years was with Thornton, who differed from him in a great many things, but the differences were of the kind to bring into lively exercise Mill's argumentative powers.

My next topic in the delineation of Mill's character, is his **STYLE**. He is allowed to be not only a great thinker, but a good writer. His lucidity, in particular, is regarded as pre-eminent. Exceptions are taken by the more fastidious critics; he is said by Mr. Pattison to be wanting in classical grace and literary polish.

I have already expressed the opinion that the language faculty in him was merely ordinary. Great cultivation had given him a good command of expression for all his purposes, but nothing could have made him a Macaulay. To begin with his vocabulary—including in that, not simply the words of the English dictionary, but the stock of phrases coined by our literary predecessors for expressing single ideas—we cannot say that in this he was more than a good average among men of intelligence and culture. He was greatly inferior to Bentham in the copiousness, the variety of his primary stock of language elements. He was surpassed, if I mistake not, by both the Austins, by Grote and by Roebuck. Had he been required to express the same idea in ten different forms, all good, he would have come to a standstill sooner than any of those.

His grammar is oftener defective than we should expect in any one so carefully disciplined as he was from the first. In some of the points that would be deemed objectionable, he probably had theories of his own. His placing of the troublesome words “only” and “not only” is, in my judgment, often wholly indefensible. Scores of examples of such constructions as the following, may be produced from his writings:—“Astræa must *not only* have returned to earth, but the heart of the worst

man must have become her temple." "He lived to see almost all the great principles which he had advocated *not merely* recognised, but a commencement made in carrying them into practice." "It is *not* the uncontrolled ascendancy of popular power, *but* of any power that is to be dreaded." "We can *only* know a substance through its qualities, but also, we can *only* know qualities as inhering in a substance. Substance and attribute are correlative, and can *only* be thought together: the knowledge of each, therefore, is relative to the other; but need not be, and indeed is not, relative to us. For we know attributes as they are in themselves, and our knowledge of them is *only* relative inasmuch as attributes have *only* a relative existence. It is relative knowledge in a sense not contradictory to absolute. It is an absolute knowledge, though of things which *only* exist in a necessary relation to another thing called a substance." "And in these days of discussion, and generally awakened interest in improvement, what formerly was the work of centuries, often requires *only* years." "Men, as well as women, do not need political rights in order that they may govern, but in order that they may not be misgoverned." This should be—"Men, as well as women, need political rights, *not* in order that they may govern, &c." The sentence where he describes his early upbringing as regards religion, cannot be construed on any known rules of grammar. "I am thus one of the very few examples, in this country, of one who has not thrown off religious belief, but never had it." The re-construction of this on grammatical principles is likely to become one of the stock exercises in our manuals of English Composition.

Critically examined, his style is wanting in delicate attention to the placing of qualifying words generally. He had apparently never thought of this matter farther than to satisfy himself that his sentences were intelligible.

Another peculiarity of grammar tending to make his style not unfrequently heavy, and sometimes a little obscure, was the excess of relatives, and especially of the heavy relatives

"which" and "who". He never entered into the distinction of meaning between those two, and "that" as a relative. Like many other writers, he used "that" only as a relief after too many "whiches". Here is an example:—"Inasmuch as any, even unintentional, deviation from truth, does that much towards weakening the trustworthiness of human assertion, *which* is not only the principal support of all present social well-being, but the insufficiency of *which* does more than anything *that* can be named to keep back civilisation, virtue, everything *on which* human happiness on the largest scale depends". Early familiarity with French is apt to produce an insensibility to the clogging effect of a great number of "whiches," and a consequent inattention to the many easy devices for keeping clear of the excess.

In the use of the pronoun "it," he did not display the care usually taken by good writers of the present day, to avoid uncertainty and ambiguity of reference.

His father's weakness for the "I know not" form is occasionally seen in him also.

Instances of looseness not falling under any special type are frequent enough. The following might possibly have been corrected, if he had lived to superintend the printing of the work where it occurs:—"The patience of all the founders of the Society was at last exhausted, except me and Roebuck".

Of arts of the rhetorical kind in the structure of his sentences, he was by no means wanting. He could be short and pithy, which goes a great way. He had likewise caught up, probably in a good measure from the French writers, his peculiar epigrammatic smartness, which he practised also in conversation. He would often express himself thus:—"It is one thing to tell the rich that they ought to take care of the poor, and another thing to tell the poor that the rich ought to take care of them". A historian, he says, must possess gifts of imagination; "and what is rarer still, he must forbear to abuse them". "With the genius for producing a great historical romance, he must

have the virtue to add nothing to what can be proved to be true." To the attacks made upon the French historians, for superficiality and want of research, he replies with a piquancy that is more than mere style:—"Voltaire gave false views of history in many respects, but not falser than Hume's; Thiers is inaccurate, but not less so than Sir Walter Scott".

He was not deficient in the power of illustration by metaphor and allusion, although he could not in this respect compare with men whose strength consists mainly in the power of expression. Moreover, as expository style requires that illustrations should be apposite, their employment is limited with precise writers.\*

As a whole, I should say that Mill was wanting in strength, energy, or momentum. His happiest strokes were of the nature of a coruscation—a lightning flash, rather than effects of impetus or mass in motion. His sentences and paragraphs are apt to be diffuse; not because of unnecessary circumstances, but from a want of steady endeavour after emphasis by good collocation and condensation. Every now and then, one of his pithy sentences comes across us, with inexpressible welcome. He is himself conscious when he is becoming too involved, and usually endeavours to relieve us by a terse summary at the close of the paragraph.

What I mean by not studying emphasis, may be exemplified by a quotation. The following shows his brief and epigrammatic style, in a fair average. The concluding sentence is what I chiefly call attention to. The passage is directed against the philanthropic theory of the protection of the poor by the rich:—

\* He had a dread of running into a figurative or florid style. I remember a curious illustration in point. He had written an article for the *Westminster Review*, but, having gone abroad before a proof was ready, he left the correcting to the editor, Hickson. I saw him on his return, and he was in a state of great annoyance at the numerous misprints that had been allowed to pass. One of these was a very excusable error. He had written "the family in the patriarchal sense," and the printer had changed it into "tents"; making, as he said, in a complaining tone, a picture.



"Mankind are often cautioned by divines and moralists against unreasonableness in their expectations. We attach greater value to the more limited warning against inconsistency in them. The state of society which this picture represents, is a conceivable one. We shall not at present inquire if it is of all others the most eligible one, even as an Utopia. We only ask if its promoters are willing to accept this state of society together with its inevitable accompaniments."

What I should wish to see strengthened here, is the emphasis upon the concluding circumstance *inevitable accompaniments*, wherein lies the whole stress of the matter. A very little change would improve it. "We only ask if the advocates of this state of society *are willing to accept its inevitable accompaniments*."

We can now view all those peculiarities in connexion with his Expository art in general, of which they are important accessories without being the main elements. Exposition, in its typical character, embodies the clear statement and adequate exemplification of principles. Where this central circumstance is well attended to, the result cannot be a failure. Now, Mill was at home here. He knew how to introduce a generality, how to state it clearly, and what amount of exemplification was needed for the ordinary reader. He could occasionally provide very good illustrations as distinct from examples, that is to say, figurative comparisons, or similes. In the strict forms of exposition, logical power comes in aid; the logician is well accustomed to see the one in the many, and the many in the one—the generality in the particulars, and the particulars supporting the generality.

There are far more trying situations, however, than the statement and exemplification of one single truth. A principle has often to be qualified by another principle; and both may need to be elucidated together. A different form of complication is brought out, when a subject has not one predicate but several, all requiring to be attended to. Very often what has to be

expounded is a highly complex idea, whose defining particulars have to be separately illustrated. These are a few of the testing forms of the expository art. Such matters cannot be despatched *currente calamo*—with the pen of a ready writer. They need careful retouching to find for each particular the best possible place. Mill has often such topics to handle, and certainly does not fall below the average of ordinary writers; yet he does not rise above being passable. Two examples, each with a special character, will show what is intended.

The first is his exposition of Nationality. I quote a part :—

“A portion of mankind may be said to constitute a Nation-ality, if they are united among themselves by common sympathies, which do not exist between them and any others—which make them co-operate with each other more willingly than with other people, desire to be under the same government, and desire that it should be government by themselves, or a portion of themselves, exclusively. This feeling of nationality may have been generated by various causes. Sometimes it is the effect of identity of race and descent. Community of language, and community of religion, greatly contribute to it. Geographical limits are one of its causes. But *the strongest of all* is identity of political antecedents; the possession of a national history, and consequent community of recollections; collective pride and humiliation, pleasure and regret, connected with the same incidents in the past. None of these circumstances, however, are either indispensable, or necessarily sufficient by themselves. Switzerland has a strong sentiment of nationality, though the cantons are of different races, different languages, and different religions. Sicily has hitherto felt itself quite distinct in nationality from Naples, notwithstanding identity of religion, almost identity of language, and a considerable amount of common historical antecedents. The Flemish and the Walloon provinces of Belgium,

notwithstanding diversity of race and language, have a much greater feeling of common nationality, than the former have with Holland, or the latter with France. Yet in general the national feeling is proportionally weakened by the failure of any of the causes which contribute to it. Identity of language, literature, and, to some extent, of race and recollections, have maintained the feeling of nationality in considerable strength among the different portions of the German name, though they have at no time been really united under the same government; but the feeling has never reached to making the separate states desire to get rid of their autonomy. Among Italians an identity, far from complete, of language and literature, combined with a geographical position which separates them by a distinct line from other countries, and, perhaps more than everything else, the possession of a common name, which makes them all glory in the past achievements in arts, arms, politics, religious primacy, science, and literature, of any who share the same designation, give rise to an amount of national feeling in the population, which, though still imperfect, has been sufficient to produce the great events now passing before us: notwithstanding a great mixture of races, and although they have never, in either ancient or modern history, been under the same government, except while that government extended or was extending (itself) over the greater part of the known world."

Now there is nothing here but what might be made out by attention and study; yet very little is done to assist the reader in keeping the different ideas distinct, still less in retaining a coherent view of the whole. For one thing, the proper definition should have been made into a separate paragraph, and a little more illustration given to its constituent ideas. Concrete examples might have been adduced of the working of the feeling in itself. When he came to inquire into the *causes*, he should have started a new paragraph, to keep this part quite distinct from the meaning of the fact. Then, in

stating the causes, he would have done well to have presented them numerically, and in parallel sentence forms. A much more natural arrangement could be given, thus :—Geographical limits, race, language, religion, history or political antecedents (strongest of all). Then comes the qualification—no one is indispensable in itself. His train of examples instead of being appended to the causes themselves is appended to this qualifying statement ; an arrangement of very doubtful propriety.

A still more testing situation is given in the following attempt to expound a contrasting couple—Central and Local Authority. The contrast is run upon a two-fold predicate ; that is, the comparative merits of the two forms, are put under two heads. The complication thus arising can be readily foreshadowed ; a contrasting couple of subjects, with two predicates to each, under affirmation and denial,—keeps no less than eight propositions running through the paragraph. They cannot be given in strict linear order, because they have to be compared and contrasted throughout. If we could write in several parallel columns, and if the human mind could attend to three or four trains at one moment, all this would be much easier. But conditioned as we are, the difficulties are very great. By no ingenuity can the comprehension of the theme be made easy ; but there are ways and means of alleviating the complications, the account of which is the higher art of Exposition. I quote the paragraph that I have in view :—

“ To decide this question, it is essential to consider what is the comparative position of the central and the local authorities, as to capacity for the work, and security against negligence and abuse. In the first place, the local representative bodies and their officers are almost certain to be of a much lower grade of intelligence and knowledge, than Parliament and the national executive. Secondly, besides being themselves of inferior qualifications, they are watched by and accountable to, an inferior public opinion. The public under whose eyes they

act, and by whom they are criticised, is both more limited in extent, and generally far less enlightened, than that which surrounds and admonishes the highest authorities at the capital; while the comparative smallness of the interests involved, causes even that inferior public to direct its thoughts to the subject less intently, and with less solicitude. Far less interference is exercised by the press and by public discussion, and that which is exercised may with much more impunity be disregarded, in the proceedings of local, than in those of national authorities. Thus far, the advantage seems wholly on the side of management by the central government. But when we look more closely, these motives of preference are found to be balanced by others fully as substantial. If the local authorities and public are inferior to the central ones in knowledge of the principles of administration, they have the compensatory advantage of a far more direct interest in the result. A man's neighbours or his landlord may be much cleverer than himself, and not without an indirect interest in his prosperity, but for all that, his interests will be better attended to in his own keeping than in theirs. It is further to be remembered, that even supposing the central government to administer through its own officers, its officers do not act at the centre, but in the locality; and however inferior the local public may be to the central, it is the local public alone which has any opportunity of watching them, and it is the local opinion alone which either acts directly upon their own conduct, or calls the attention of the government to the points in which they may require correction. It is but in extreme cases that the general opinion of the country is brought to bear at all upon details of local administration, and still more rarely has it the means of deciding upon them with any just appreciation of the case. Now, the local opinion necessarily acts far more forcibly upon purely local administrators. They, in the natural course of things, are permanent residents, not expecting to be withdrawn from the place when they cease to exercise authority in it; and their authority itself

depends, by supposition, on the will of the local public. I need not dwell on the deficiencies of the central authority in detailed knowledge of local persons and things, and the too great engrossment of its time and thoughts by other concerns, to admit of its acquiring the quantity and quality of local knowledge necessary even for deciding on complaints, and enforcing responsibility from so great a number of local agents. "In the details of management, therefore, the local bodies will generally have the advantage ; but in comprehension of the principles even of purely local management, the superiority of the central government, when rightly constituted, ought to be prodigious : not only by reason of the probably great personal superiority of the individuals composing it, and the multitude of thinkers and writers who are at all times engaged in pressing useful ideas upon their notice, but also because the knowledge and experience of any local authority is but local knowledge and experience, confined to their own part of the country and its mode of management, whereas the central government has the means of knowing all that is to be learnt from the united experience of the whole kingdom, with the addition of easy access to that of foreign countries."

If it were not that the eight floating propositions are at last reduced, in the concluding sentence, to a summary statement of two, this would be a very hopeless paragraph. The means of amending it does not consist in any one expedient, but in a great number of little details of arrangement, which would make its re-composition a work of considerable study.

To quote such examples as these is to put any man to a severe trial ; and few would come well through it. But criticism, if it is to be of use at all, should not shirk the difficult cases.

Enough has been said of Mill as an expositor ; there remains his capability in Persuasion. Intermediate between the two functions, if not rather a combination of both, was his remark-

able polemical aptitude. But I shall speak now of his persuasive power, which I conceive to be very great on the whole, and susceptible of being precisely defined.

The power of persuasion was with him not much a matter of mere style ; it lay more in his command of thoughts, and in his tact, in discerning what would suit the persons addressed. When he set himself to argue a point, his information and command of principles usually enabled him to exhaust his case. His political writing is enough to show this.

It was seldom that he was deficient in knowledge of his audience. If he ever failed here, it was in matters of religion, where he was necessarily little informed, and on the women question, where his feelings carried him too far.

Not only could he shape arguments to the reason, properly so called, he could also address the feelings. The *Liberty* and the *Subject of Women*, as well as his political writing generally, exemplify what might be called impassioned oratory ; they leave nothing unsaid that could enlist the strongest feelings of the readers. His best Parliamentary speeches appealed to the understanding and to the feelings alike, and he seldom, so far as I can judge, lost ground for want of suiting himself to a most difficult assembly. Although he could not clothe his feelings with the richness of poetry, he could warm with his subject, and work by the force of sympathy.

All this, as I have already observed, had to do with knowledge and thinking power, more than with style. In the oratory of rhetoric, he was entirely wanting. He could appeal to men's feelings by suitable circumstances plainly and even forcibly stated ; but that luxuriance of verbal display, whereby the emotions can be roused with a hurricane's might, was not a part of his equipment. He could not be an orator in the same sense as the two Pitts, Burke, Canning, Brougham, Macaulay, D'Israeli, or any of our rhetorical writers ; although I am not sure that he might not often have rivalled such men in actual effect, by the gifts that were peculiarly his own.

The powerful adjunct of Wit was hardly within his reach, any more than rhetorical display in general. He had the sense of humour, but not a sufficient creative power to embody it in writing ; and he was careful not to attempt what he could not do well. I can recall but one example of real Wit such as might have come from Sydney Smith or Fonblanque.

In his article on Corporation and Church Property, he replies to the stock arguments against diverting old foundations. He makes full allowance for compensation to present holders of life interests. Still this does not appease the opposition :—

“Would you rob the Church? it is asked. And at the sound of these words rise up images of rapine, violence, plunder ; and every sentiment of repugnance which would be excited by a proposal to take away from an individual the earnings of his toil or the inheritance of his fathers, comes heightened in the particular case by the added idea of sacrilege.

“But the Church ! Who is the Church ? Who is it that we desire to rob ? Who are the persons whose property, whose rights we are proposing to take away ?

“Not the clergy ; from them we do not propose to take anything. To every man who now benefits by the endowment, we have said that we would leave his entire income ; at least until the State shall offer, as the purchase money of his services in some other shape, advantages which he himself shall regard as equivalent.

“But if not the clergy, surely we are not proposing to rob the laity : on the contrary, they are robbed now, if the fact be, that the application of the money to its present purpose is no longer advisable. We are exhorting the laity to *claim* their property out of the hands of the clergy ; who are not the Church, but only the managing members of the association.

“*Qui trompe-t-on ici ?* asks Figaro. *Qui vole-t-on ici ?* may well be asked. What man, woman, or child, is the victim of this robbery ? Who suffers by the robbery when everybody robs nobody ? But though no man, woman, or child is robbed,



the Church it seems is robbed. What follows? That the Church may be robbed, and no man, woman, or child be the worse for it. If this be so, why, in Heaven's name, should it not be done? If money or money's worth can be squeezed out of an abstraction, we would appropriate it without scruple. We had no idea that the region

Where entity and quiddity,  
The ghosts of defunct bodies, fly,

was an Eldorado of riches. We wish all other abstract ideas had as ample a patrimony. It is fortunate that their estates are of a less volatile and airy nature than themselves, and that here at length is a '*chimæra bombinans in vacuo*,' which lives upon something more substantial than '*secundas intentiones*'. We hold all such *entia rationis* to be fair game, and their possessions a legitimate subject of invasion and conquest.

"Any act may be a crime, if giving it a bad name could make it so; but the robbery that we object to must be something more than robbing a word. The laws of property were made for the protection of human beings, and not of phrases. As long as the bread is not taken from any of our fellow-creatures, we care not though the whole English dictionary had to beg in the streets."

The mathematicians, owing to their very high pretensions to set forth reasoning in its most perfect form, have exposed themselves to the jibes of profane wit. Thus, Berkeley ridiculed the Fluxions of Newton, as made up of the "ghosts of departed quantities". Mill contributes to the same purpose. Speaking of Mathematics as a whole, he says, "it is as full of fictions as English Law, and of mysteries as Theology".

I have now a few remarks to make upon his Conversational power, which was part of his influence, although not to so great a degree as in his father's case. That he was a striking talker, even as a boy, we have good testimony. Still, he impressed

people very differently, and when he was twenty-four he was described by Charles Greville in these terms :—

“ November 15th [1830].—Yesterday morning I breakfasted with Taylor (Henry) to meet Southey : the party was Southey ; Strutt, member for Derby, a Radical ; young Mill, a political economist ; Charles Villiers, young Elliot, and myself. . . . Young Mill is the son of Mill who wrote the ‘ History of British India,’ and is said to be cleverer than his father. He has written many excellent articles in reviews, pamphlets, &c. ; but though powerful with a pen in his hand, in conversation he has not the art of managing his ideas, and is consequently hesitating and slow, and has the appearance of being always working in his mind propositions or a syllogism.”

Any one that knew him twelve years later would not recognize the smallest resemblance in this picture. He had no want of the art of managing his ideas ; quite the opposite : he was neither hesitating nor slow : and there was nothing in the order of his statements that suggested syllogisms.

A writer in the *Edinburgh Review* (January, 1874), who knew him from early years, gives a delineation, which seems to me not much nearer the mark :—

“ His manners were shy and awkward. His powers of conversation, though remarkable enough in argument, were wholly didactic and controversial. He had no humour, no ‘ talk,’ and indeed no interest in the minor concerns of life. He had been bred in a small *coterie* of people of extreme opinions, whom he regarded as superior beings, and he seemed to shrink from all contact with ordinary mortals. In later life he affected something of the life of a prophet, surrounded by admiring votaries, who ministered to him largely that incense in which prophets delight. He had neither the wit and readiness which adorn the higher circles of the world, nor the geniality and desire to oblige which impart a charm to the lower.”

His shyness and awkwardness I entirely failed to perceive. His conversation was not limited to argument ; he had humour

and lightness, and did not restrain their display. He did not shrink from contact with ordinary mortals, and had a great many occasions of encountering such: if it were only during the six hours a day, for thirty-five years, that he spent in a busy State office, encompassed with superiors, equals, and inferiors. He had wit and readiness such as we do not find often surpassed in the "higher circles". No one pretends that he was a Sydney Smith. I believe that the one thing that took the London public by surprise in 1865, and carried his election for Westminster, was his wit and readiness.

The material of a man's conversation must be his amassed knowledge; and a writer shows that by his books. The nearest approach to actual conversation is letter-writing; we may judge of people's talk by their familiar correspondence. What books and letters fail to show is conversation as such; and includes elements of considerable efficacy in themselves. All that relates to voice, delivery, gesture, and play of countenance—the purely physical part—is imperfectly conceivable through mere description. The part not physical is the conduct as regards the listeners; which fluctuates between the two extremes of lecture or monologue, in the Coleridge style, and short question and answer, in the Socratic style.

Mill's voice was agreeable, although not specially melodious; it was thin and weak. His articulation was not very clear. His elocution was good, without being particularly showy or impressive; he had a mastery of emphasis; his modulation was sufficiently removed from monotone, so that there was nothing wearying in his manner. He had not much gesture, but it was all in keeping; his features were expressive without his aiming at strong effects. Everything about him had the cast of sobriety and reserve; he did no more than the end required. There was so little of marked peculiarity in his speaking, that I never knew anyone that could mimic him successfully in the enunciation of a sentence. Very few people could assume his

voice, to begin with ; and his modulation was simply correct and colourless elocution.

I can account for his seeming hesitation of manner. Although he did not study grand and imposing talk, he always aimed at saying the right thing clearly and shortly. He was perfectly fluent, but yet would pause for an instant to get the best word, or the neatest collocation : and he also liked to finish with an epigrammatic turn. He was one day expressing his admiration of Charles Buller, and then, alluding to Roebuck, remarked he was equally good in his way, "but it was not so good a way".

His demeanour with reference to the other participants in the conversation was sufficiently marked. He never lectured or declaimed, or engrossed the talk. He paused at due intervals, to hear what the others had to say ; and not merely heard, but took in, and embodied that in his reply. With him, talk was, what it ought to be, an exchange of information, thought, and argument, when it assumed the form of discussion ; and an exchange of sympathies when the feelings were concerned. He did not care to converse on any other terms than perfect mutuality. He would expound or narrate at length when it was specially wished ; and there were, of course, subjects that it was agreeable to him to dilate upon ; but he wished to be in accord with his hearers, and to feel that they also had due openings for expressing concurrence or otherwise.\*

I have sometimes been surprised at his readiness to answer any question or plunge into any topic that might be propounded. I should have often expected him to resist such rapid transitions of subject as I have seen him led into ; but, in talk with people that he cared for, he did not resent a desultory chace.

It is mainly with reference to his conversation, that we are

\* He had a good-humoured contempt for the monologue talkers. When Sydney Smith's well-known saying on Macaulay came out (unusually brilliant, some splendid flashes of silence), Mill capped it with a story of two Frenchmen of this species, pitted against each other. One was in full possession, but so intent was the other upon striking in, that a third person watching the contest, exclaimed, "If he spits, he's done".

entitled to speak of him as possessing Wit and Humour. He had not sufficient originality of style to yield literary effects worthy of being printed ; but, like many other people having the same limitations, he had more than enough to be entertaining and genial in society and in talk. For the same reason that Wit fails to display itself in his books, he did not produce many quotable sayings ; having so little love of display, he did not make any efforts in this direction. I don't remember any saying of his at all comparable to Cornewall Lewis's—"Life would be tolerable, but for its amusements" ; but he made numerous sallies that amused the moment, as well as amateur wit usually does ; his enjoyment of a good joke was intense ; and his range of subjects was wide and liberal. He had the essential conditions of a humourist, as opposed to scornful, scathing mockery of the Swift and Voltaire stamp : that is to say, sympathy and warmth of feeling, and the absence of egotistic fears as to his own dignity.\*

Carlyle's phrase in the "Reminiscences" describing Mill's conversation as "sawdustish" shows his worst temper, without his usual felicity. As Mill did not lecture, but talk, he always gave Carlyle himself abundant rope, and brought him out, as only a small number of his friends could do. I never saw the two together but once. Calling at the India House, at Mill's hour for leaving, I found Carlyle in the room. We walked together to the London Library, Carlyle having the largest share of the talk. I remember only the conclusion. It was as

\* I remember walking with him by Trafalgar Square, one afternoon, when an advertising board set forth a dwarf figure wearing a helmet, and holding a long javelin, but otherwise completely nude. This professed to be "GENERAL TOM THUMB AS ROMULUS". (The dwarf had been giving a round of personations). It caught Mill's eye, and put him into convulsions.

He was fond of taking off his father's Scotch friends that came to the house. The best bit of humour of this sort that I remember his telling, was upon Professor Wallace. About the time when knighthoods were given to a number of scientific men—Brewster, Leslie, and others—Wallace happened to be staying with the Mills. He was asked (I have no doubt by John Mill himself) why he had not been knighted. His answer was—"ye see they would ca' me Sir Weelyam Wallace".

we were entering St. James's Square, that Carlyle was denouncing our religion and all its accessories. Mill struck in with the remark—"Now, you are just the very man to tell the public your whole mind upon that subject". This was not exactly what Carlyle fancied. He gave, with his peculiar grunt, the exclamation—"Ho," and added, "it is some one like Frederick the Great that should do that".

The recently published "Journals of Caroline Fox" gives some very interesting pictures of Mill's conversations and ways, as he appeared between 1840 and 1846. His opinions about things in general in those years, so far as shown to the Falmouth circle, are very fairly set forth. The thing wanting to do full justice to his conversation is to present it in dialogue, so as to show how he could give and take with his fellow-talkers. A well-reported colloquy between him and Sterling would be very much to the purpose. He appears to great advantage in the way that he accommodated himself to the kind Foxes, on the occasion of staying at Falmouth during Henry's last illness. The letter to Barclay Fox, which I have referred to above (p. 61), is given at length. A remark of Sterling's is quoted, which corroborates what I have already said as to Mill's want of concreteness:—"Mill has singularly little sense of the concrete, and, though possessing deep feeling, has little poetry". He had, it seems to me, the sense and the feeling, but not the power of expression, or of concrete embodiment in language—which is the distinctive mark of the poetic genius. He was born to read, and not to write, poetry.

A few lines on Mill's influence, past, present, and future, will bring our sketch to a close. Not that the topic has been left hitherto untouched; but that an express reference will serve to bring up a few novel illustrations.

It is not for the opportunity of contradicting former opinions respecting him, but because the polemic and criticism of others are often more suggestive than mere exposition, that I quote

some of the unfavourable estimates of his character and influence. His great friend, Nassau Senior—a man of various accomplishments and of large acquaintance with people—spoke of him thus, in 1844, in a letter to the Editor of the *Edinburgh*:—"Factory labour must be left to Mill. He will be ingenious and original, though I own I do not quite trust his good sense. He has been bitten by Carlyle and Torrens, and is apt to puzzle himself by the excess of his own ingenuity. Like Ricardo too, he wants 'keeping'. He does not cut a knot which is insoluble; but lets a real, but comparatively unimportant difficulty stand in the way of practical action." This is a specimen of a kind of criticism that I have often heard regarding Mill. It was really a mode of expressing difference of judgment on particular points. Mill was no doubt at times unpractical, but so, in my humble opinion, was Senior. I have met him occasionally, and admired him as a converser; but I never saw any great wisdom in his political views. If I were to give an example, it would be his persistently recommending for years the endowment of the Irish Roman Catholic Priests from the public exchequer.

A still more decisively unfavourable judgment is passed upon Mill's influence by his critic in the *Edinburgh Review*. "In truth, if the whole work of his life be examined, it will be found to be eminently destructive, but not to contain one practical constructive idea." This comes to the very point that I wish to start from. It lays out his two sides—destructive and constructive—and pronounces distinctly upon each.

His destructive agency has undoubtedly been great; but it is still unexhausted, and is difficult to estimate with precision. His influence must be taken along with Bentham's and his father's; and a more formidable trio, for the work of pulling down rotten structures, never came together. But it would be a monstrous perversion of fact to call them nothing but destroyers.

In politics, everything must be done by co-operation, and

single individuals can rarely claim an undivided merit. If, however, what Mill says of the part he took in supporting Lord Durham, in the *London and Westminster Review*, is proof against refutation, he has rendered a great service to the world in one important region of affairs. His words are:—"Lord Durham's report, written by Charles Buller, partly under the inspiration of Wakefield, began a new era; its recommendations, extending to complete internal self-government, were in full operation in Canada within two or three years, and have been since extended to nearly all the other colonies of European race, which have any claim to the character of important communities. And I may say that in successfully upholding the reputation of Lord Durham and his advisers at the most important moment, I contributed materially to this result."

I call the whole of his doctrines regarding the greatest political problem of all—the elevating of the class that needs to be elevated—in an eminent degree sound in themselves and prolific of the best consequences, although we may not be able to single out any one distinctive or separate result. When both parties in the State were helping to poison and delude the working men, he (after his father) was steadily occupied in sweeping away the refuges of lies—in teaching them self-dependence, and in warning them against bubbles and expectations of immediate relief. He dared to tell them, as well as other people, unpalatable truths; and but, for his teaching, the Chartism of the thirties might have been far more perilous.

Whatever may be the view taken of the political claims put forward in behalf of women, it will be allowed that Mill has done more than any single person for the bread-earners of the sex. The cold philosophy of Sir James Stephen would not have taken the place of his apostolic zeal, in obtaining the concessions of the last few years for bettering the education of women, and for widening the spheres of their industry.

Mill, having not only inherited, but also shared, his father's responsibility in urging upon this country a great extension of



the suffrage, considered it a part of his calling to set forth all the possible dangers of placing power in the hands of the majority. He gave his first note of warning on this point, in the Bentham article; the topic came up again in his reviews of De Tocqueville, and is treated at length in the *Representative Government*. Although, in point of fact, the transfer of power has gone on, as is usual, through the scramble of parties, by flukes and leaps in the dark, these warnings are not thrown away. At our present stage, we have not been able to conceive, still less to set up, an ideal minority that shall be more faithful to our collective interests than an actual majority. All the governing minorities, hitherto, have looked chiefly to themselves; and consequently the greater the extension of the suffrage, the fewer are the neglected interests. Mill is exceedingly sensitive to the welfare of small minorities, who have so little chance under the government of a majority; though, of course, equally ill off under a minority distinct from themselves. The great advantage of democracy is that all classes have votes, and can thus make their influence felt; minorities cannot have the absolute rule, but they can club with other minorities and make terms with the preponderating body, before contributing to place it in power.

That the working class, having the absolute majority of votes, may band themselves on their class interest, and seize the reins of power to the exclusion of property and capital, is at the present moment chimerical. The elder Mill's faith in the influence of the middle class, which combines wealth and intelligence with no small numerical force, stands good, so far as we have gone yet: the government is still upon their shoulders, although subject to great upper-class control. Nevertheless, we are none the worse for his son's elaborate examination of the evils that may possibly arise from the sway of mere numbers.

So much in answer to the question—what has Mill done by way of construction in social philosophy? His constructiveness in other branches is less ambiguous; I mention for the last

time, but without further comment, the Logic of Induction.

Although in order to a permanent reputation, it is necessary to produce a work great in itself and of exclusive authorship, yet this is not the only way that original power manifests itself. A multitude of small impressions may have the accumulated effect of a mighty whole. Who shall sum up Mill's collective influence as an instructor in Politics, Ethics, Logic, and Metaphysics? No calculus can integrate the innumerable little pulses of knowledge and of thought that he has made to vibrate in the minds of his generation.

The united careers of the two Mills covered exactly a century. A day chosen between the 6th April and the 7th May, 1973, would serve as a double centenary, when their conjoint influence might be finally summed up.



## APPENDIX.

### *J. E. Cairnes on Mill's Political Economy.*

As I have been able to say very little on Mill as a Political Economist, I am happy in being able to quote the estimate formed of him in this capacity by his friend, Cairnes. It was one of a series of notices of Mill's labours published in the *Examiner* after his death.

The task of fairly estimating the value of Mr. Mill's achievements in Political Economy—and, indeed, the same remark applies to what he has done in every department of philosophy—is rendered particularly difficult by a circumstance which constitutes their principal merit. The character of his intellectual, no less than of his moral nature, led him to strive to connect his thoughts, whatever was the branch of knowledge at which he laboured, with the previously existing body of speculation, to fit them into the same framework, and exhibit them as parts of the same scheme; so that it might be truly said of him that he was at more pains to conceal the originality and independent value of his contributions to the stock of knowledge than most writers are to set forth those qualities in their compositions. As a consequence of this, hasty readers of his works, while recognizing the comprehensiveness of his mind, have sometimes denied its originality; and in political economy in particular he has been frequently represented as little more than an expositor and populariser of Ricardo. It cannot be denied that there is a show of truth in this representation; about as much as there would be in asserting that Laplace and Herschell were the expositors and popularizers of Newton, or that Faraday performed a like office for Sir Humphrey Davy. In truth, this is an incident of all progressive science. The cultivators in each age may, in a sense, be said to be the interpreters and popularizers of those who have preceded them; and it is in this sense, and in this sense only, that this part can be attributed to Mill. In this respect he is to be strongly contrasted with the great majority of writers on political economy, who, on the strength, perhaps, of a verbal correction, or an unimportant qualification, of a received doctrine, if not on the score of a pure fallacy, would fain persuade us that they have achieved a revolution in economic doctrine, and that the entire science must be rebuilt from

its foundation in conformity with their scheme. This sort of thing has done infinite mischief to the progress of economic science ; and one of Mill's great merits is that both by example and by precept he steadily discountenanced it. His anxiety to affiliate his own speculations to those of his predecessors is a marked feature in all his philosophical works, and illustrates at once the modesty and comprehensiveness of his mind.

It is quite true that Mill, as an economist, was largely indebted to Ricardo, and he has so fully and frequently acknowledged the debt that there is some danger of rating the obligation too highly. As he himself used to put it, Ricardo supplied the back-bone of the science ; but it is not less certain that the limbs, the joints, the muscular developments—all that renders political economy a complete and organized body of knowledge—have been the work of Mill. In Ricardo's great work the fundamental doctrines of production, distribution, and exchange, have been laid down, but for the most part in mere outline, so much so that superficial students are in general wholly unable to connect his statement of principles with the facts, as we find them, of industrial life. Hence, we have innumerable "refutations of Ricardo"—almost invariably refutations of the writers' own misconceptions. In Mill's exposition the connexion between principles and facts becomes clear and intelligible. The conditions and modes of action are exhibited by which human wants and desires—the motive powers of industry—come to issue in the actual phenomena of wealth ; and Political Economy becomes a system of doctrines susceptible of direct application to human affairs. As an example, I may refer to Mill's development of Ricardo's doctrine of foreign trade. In Ricardo's pages the fundamental principles of that department of exchange are indeed laid down with a master's hand ; but, for the majority of readers, they have little relation to the actual commerce of the world. Turn to Mill, and all becomes clear. Principles of the most abstract kind are translated into concrete language, and brought to explain familiar facts, and this result is achieved, not simply or chiefly by virtue of mere lucidity of exposition, but through the discovery and exhibition of modifying conditions and links in the chain of causes overlooked by Ricardo. It was in his *Essays on Unsettled Questions in Political Economy* that his views upon this subject were first given to the world—a work of which M. Cherbuliez of Geneva, speaks as "un travail le plus important et le plus original dont la science économique se soit enrichie depuis une vingtaine d'années".

On some points, however, and these points of supreme importance, the contributions of Mill to economic science are very much more than developments—even though we understand that term in its largest sense—of any previous writer. No one can have studied political economy in the works of its earlier cultivators without being struck with the dreariness of the

outlook which, in the main, it discloses for the human race. It seems to have been Ricardo's deliberate opinion that a substantial improvement in the condition of the mass of mankind was impossible. He considered it as the normal state of things that wages should be at the *minimum* requisite to support the labourer in physical health and strength, and to enable him to bring up a family large enough to supply the wants of the labour market. A temporary improvement, indeed, as the consequence of expanding commerce and growing capital, he saw that there might be ; but he held that the force of the principle of population was always powerful enough so to augment the supply of labour as to bring wages ever again down to the *minimum* point. So completely had this belief become a fixed idea in Ricardo's mind, that he confidently drew from it the consequence that in no case could taxation fall on the labourer, since—living, as a normal state of things, on the lowest possible stipend adequate to maintain him and his family—he would inevitably, he argued, transfer the burden to his employer, and a tax, nominally on wages, would, in the result, become invariably a tax upon profits. On this point Mill's doctrine leads to conclusions directly opposed to Ricardo's, and to those of most preceding economists. And it will illustrate his position as a thinker, in relation to them, if we note how this result was obtained. Mill neither denied the premises nor disputed the logic of Ricardo's argument ; he accepted both ; and in particular he recognized fully the force of the principle of population ; but he took account of a further premiss which Ricardo had overlooked, and which, duly weighed, led to a reversal of Ricardo's conclusion. The *minimum* of wages, even such as it exists in the case of the worst paid labourer, is not the very least sum that human nature can subsist upon ; it is something more than this ; in the case of all above the worst paid class it is decidedly more. The *minimum* is, in truth, not a physical, but a moral *minimum*, and, as such, is capable of being altered with the changes in the moral character of those whom it affects. In a word, each class has a certain standard of comfort below which it will not consent to live, or, at least, to multiply—a standard, however, not fixed, but liable to modification with the changing circumstances of society, and which in the case of a progressive community is, in point of fact, constantly rising, as moral and intellectual influences are brought more and more effectually to bear on the masses of the people. This was the new premiss brought by Mill to the elucidation of the wages question, and it sufficed to change the entire aspect of human life regarded from the point of view of Political Economy. The practical deductions made from it were set forth in the celebrated chapter on "The Future of the Industrial Classes"—a chapter which, it is no exaggeration to say, places a gulf between Mill and all who preceded him, and opens an entirely new vista to economic speculation.

The doctrine of the science with which Mill's name has been most prominently associated, within the last few years, is that which relates to the economic nature of land, and the consequences to which this should lead in practical legislation. It is very commonly believed that on this point Mill has started aside from the beaten highway of economic thought, and propounded views wholly at variance with those generally entertained by orthodox economists. No economist need be told that this is an entire mistake. In truth there is no portion of the economic field in which Mill's originality is less conspicuous than in that which deals with the land. His assertion of the peculiar nature of landed property, and again his doctrine as to the "unearned increment" of value arising from land with the growth of society, are simply direct deductions from Ricardo's theory of rent, and cannot be consistently denied by any one who accepts that theory. All that Mill has done here has been to point the application of principles, all but universally accepted, to the practical affairs of life. This is not the place to consider how far the plan proposed by him for this purpose is susceptible of practical realization ; but it may at least be confidently stated that the scientific basis on which his proposal rests is no strange novelty invented by him, but simply a principle as fundamental and widely recognized as any within the range of the science of which it forms a part.

I have just remarked that Mill's originality is less conspicuous in relation to the economic theory of land than in other problems of Political Economy ; but the reader must not understand me from this to say that he has not very largely contributed to the elucidation of this topic. He has indeed done so, though not, as is commonly supposed, by setting aside principles established by his predecessors, but, as his manner was, while accepting those principles, by introducing a new premiss into the argument. The new premiss introduced in this case was the influence of custom as modifying the action of competition. The existence of an active competition, on the one hand between farmers seeking farms, on the other between farming and other modes of industry as offering inducements to the investment of capital, is a constant assumption in the reasoning by which Ricardo arrived at his theory of rent. Granting this assumption, it followed that farmers, as a rule, would pay neither higher nor lower rents than would leave them in possession of the average profits on their capital current in the country. Mill fully acknowledged the force of this reasoning, and accepted the conclusion as true wherever the conditions assumed were realized ; but he proceeded to point out that, in point of fact, the conditions are not realized over the greater portion of the world, and, as a consequence, that the rent actually paid by the cultivators to the owners of the soil, by no means, as a general rule, corresponds with that portion of the produce which Ricardo considered as properly "rent". The real regulator of actual rent over the

greater part of the habitable globe was, he showed, not competition, but custom; and he further pointed out that there are countries in which the actual rent paid by the cultivators is governed neither by the causes set forth by Ricardo, nor yet by custom, but by a third cause different from either—the absolute will of the owners of the soil, controlled only by the physical exigencies of the cultivator, or by the fear of his vengeance if disturbed in his holding. The recognition of this state of things threw an entirely new light over the whole problem of land tenure, and plainly furnished grounds for legislative interference in the contracts between landlords and tenants. Its application to Ireland was obvious, and Mill himself, as the world knows, did not hesitate to urge the application with all the energy and enthusiasm which he invariably threw into every cause that he espoused.

In the above remarks I have attempted to indicate briefly some few of the salient features in Mill's contributions to the science of political economy. There is still one more which ought not to be omitted from even the most meagre summary. Mill was not the first to treat political economy as a science, but he was the first, if not to perceive, at least to enforce the lesson, that, just because it is a science, its conclusions carried with them no obligatory force with reference to human conduct. As a science it tells us that certain modes of action lead to certain results; but it remains for each man to judge of the value of the results thus brought about, and to decide whether or not it is worth while to adopt the means necessary for their attainment. In the writings of the economists who preceded Mill it is very generally assumed, that to prove that a certain course of conduct tends to the most rapid increase of wealth suffices to entail upon all who accept the argument the obligation of adopting the course which leads to this result. Mill absolutely repudiated this inference, and while accepting the theoretic conclusion, held himself perfectly free to adopt in practice whatever course he preferred. It was not for political economy or for any science to say what are the ends most worthy of being pursued by human beings: the task of science is complete when it shows us the means by which the ends may be attained; but it is for each individual man to decide how far the end is desirable at the cost which its attainment involves. In a word, the sciences should be our servants, and not our masters. This was a lesson which Mill was the first to enforce, and by enforcing which he may be said to have emancipated economists from the thralldom of their own teaching. It is in no slight degree, through the constant recognition of its truth, that he has been enabled to divest of repulsiveness even the most abstract speculations, and to impart a glow of human interest to all that he has touched.





*By the same Author,*

A FIRST ENGLISH GRAMMAR, . . . 1s. 4d.  
45th THOUSAND.

A KEY WITH ADDITIONAL  
EXERCISES, . . . . . 1s. 9d.

A HIGHER ENGLISH GRAMMAR, . . . 2s. 6d.  
40th THOUSAND OF REVISED EDITION.

A COMPANION TO THE HIGHER  
GRAMMAR, . . . . . 3s. 6d.

ENGLISH COMPOSITION AND  
RHETORIC, . . . . . 4s. 0d.

LOGIC—

DEDUCTION, . . . . . 4s. 0d.

INDUCTION, . . . . . 6s. 6d.

MENTAL AND MORAL SCIENCE, . . 10s. 6d.

*The same, in Two Parts,*

MENTAL SCIENCE—Psychology and History of  
Philosophy, . . . . . 6s. 6d.

MORAL SCIENCE—Ethical Theory and Ethical  
Systems, . . . . . 4s. 6d.

THE SENSES AND THE INTELLECT.

Third Edition, . . . . . 15s. 0d.

THE EMOTIONS AND THE WILL.

Third Edition, . . . . . 15s. 0d.

London: LONGMANS, GREEN, & Co., Paternoster Row.

## REFERENCE





of coal, can be but briefly touched upon, because so few have been discovered. But little attention has been devoted to iron ore by the Alaskan geologists, for there is not a single iron mine in the Territory and at only two localities have iron-ore bodies been prospected. Relatively much more is known about the auriferous deposits, especially the placers, for here the observation of the geologist is supplemented by the many facts developed in the course of mining and prospecting. But the character of these deposits, especially that of the auriferous lodes, makes estimates of mineral reserves of but little value. The same holds true of the copper deposits, which are of too great irregularity to allow even an approximation of the available tonnage. Moreover, though copper ores find a wide distribution in the Territory, they have been mined in only two districts. Most of the copper mines are not over 200 feet in depth, one only having reached 600 feet. Predictions as to permanency of ore bodies at depth in this field, which must form an important element in estimating tonnage, can therefore have no great value.

#### GENERAL DISTRIBUTION.

The ores and other minerals mined in Alaska up to the close of the year 1907 include gold, silver, copper, lead, tin, coal, petroleum, gypsum, marble, and mineral waters. In addition to these iron, tungsten, antimony, quicksilver, graphite, and peat have been found in deposits that will probably be exploited in the future. Of these only the deposits of gold, silver, copper, lead, iron, coal, petroleum, and peat will be described in this report.

As there are no political subdivisions of Alaska, it will be desirable to refer the distribution of its resources to certain geographic provinces, and these must first be defined. (See Pl. XII.) The Pacific province includes the lode and placer districts of southeastern Alaska, the Controller Bay coal and petroleum fields, the copper lodes of Prince William Sound, the copper-bearing lodes and gold placers of the Copper River region, the gold placers and lodes and coal fields of the Susitna and Matanuska basins and of the Kenai Peninsula, and the coal fields and gold and copper lodes of the Alaska Peninsula and adjacent islands, often called southwestern Alaska. This whole coast province is a region of strong relief, and much of it is readily accessible from the waters of the Pacific, open to navigation throughout the year.

The mountain system included within the Pacific province forms a high barrier between the coast and the central province, which is of lesser relief. This central province, drained to Bering Sea by the Yukon, Kuskokwim, and some smaller rivers, includes the gold placers of the Yukon-Tanana region, the Koyukuk, and some smaller districts, as well as extensive deposits of lignitic coal. It is accessible in summer by river steamers, but in winter only by long sled journeys.

Seward Peninsula, forming a distinct province, embraces valuable gold placers, as well as some auriferous and argentiferous lodes, some tin deposits, and a little lignitic coal. It is accessible by steamer only during the summer months.

Northern Alaska is here made to include the high mountains which bound the central province on the north, as well as the region of lesser relief bordering the Arctic Ocean. This field has been but little explored, but it is known to contain some placer gold and bituminous as well as lignitic coal. It seems probable that further surveys will show the presence of extensive coal fields in northern Alaska.

These geographic subdivisions have an important influence on the question of the conservation of the mineral wealth of the Territory, for as the geographic conditions dominate the commercial exploitation of the resources, they determine in a large measure the rapidity with which these resources will become exhausted. For example, the lode deposits and coal fields readily accessible from the Pacific seaboard are being exploited for the use of the present generation. On the other hand, though the development of the placer fields of the central province began nearly a generation ago, large areas are still entirely unprospected, and the coal fields of the same region are almost entirely untouched. The coal fields of northern Alaska are not only entirely undeveloped, but are certain to remain so until the time in the future when the accessible coal of Alaska and the United States approaches exhaustion.

### COAL.

By ALFRED H. BROOKS and GEORGE C. MARTIN.

#### STRATIGRAPHIC POSITION AND COMPOSITION.

The Alaskan coals include lignitic, bituminous (some of which will make good coke), and anthracite varieties. Of these the lignitic and lower-grade bituminous coals are the most widely distributed and, so far as now known, the most abundant, at least half of the known coals being lignites. To offset their lower fuel value the lignites often occur in thick beds and with a large percentage of coal in any given section. Moreover, their geographic distribution is such that they afford an important source of fuel for local consumption in some of the less accessible parts of the Territory.

These coals belong to four geologic periods, namely, Tertiary, Cretaceous, Jurassic, and Carboniferous. In addition to these there are some inferior lignites of Quaternary age, and it is by no means improbable that further investigation may lead to the discovery of coal at still other horizons. Of these four periods only the fuels of the first three promise to have any considerable commercial importance, and all but one of the important coal fields are of Upper

Cretaceous or Tertiary age. In fact, a large part of the coal beds have been identified as belonging to the Kenai formation, whose age is believed to be upper Eocene. The Carboniferous and Jurassic coals vary in composition from semibituminous to subbituminous fuel. In the younger coal fields anthracite, various grades of bituminous, and lignitic coals are found.

The following table shows the composition of the coals from different parts of the Territory:

*Analyses of Alaska coal.*

[Compiled from reports of United States Geological Survey.]

District and kind of coal.	Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Fuel ratio.
<b>ANTHRACITE.</b>						
1. Bering River, average of 7 analyses.....	7.88	6.15	78.23	7.74	1.30	12.86
2. Matanuska River, 1 sample.....	2.55	7.08	84.32	6.05	.57	11.90
<b>SEMIANTHRACITE.</b>						
3. Bering River, average of 11 analyses.....	5.80	8.87	76.06	9.27	1.08	8.77
<b>SEMIBITUMINOUS.</b>						
4. Bering River, coking coal, average of 28 analyses...	4.18	14.00	72.42	9.39	1.73	5.28
5. Cape Lisburne, average of 3 analyses.....	3.66	17.47	75.95	2.92	.96	4.46
6. Matanuska River, coking coal, average of 16 analyses.....	2.71	20.23	65.39	11.60	.57	3.23
<b>BITUMINOUS.</b>						
7. Lower Yukon, average of 11 analyses.....	4.68	31.14	56.62	7.56	.48	1.90
<b>SUBBITUMINOUS.</b>						
8. Matanuska River, average of 4 analyses.....	6.56	35.43	49.44	8.57	.37	1.40
9. Koyukuk River, 1 sample.....	4.47	34.32	48.26	12.95	.....	1.40
10. Nation River, 1 sample.....	1.39	40.02	55.55	3.04	2.98	1.39
11. Alaska Peninsula, average of 5 analyses.....	2.34	38.68	49.75	9.22	1.07	1.30
12. Cape Lisburne, average of 11 analyses.....	9.35	38.01	47.19	5.15	.35	1.24
13. Anaktuvuk River, 1 sample.....	6.85	36.39	43.38	13.38	.54	1.20
<b>LIGNITE.</b>						
14. Port Graham, 1 sample.....	16.87	37.48	39.12	6.53	.39	1.04
15. Southeastern Alaska, average of 5 samples.....	1.97	37.84	35.18	24.23	.57	1.02
16. Wainwright Inlet, 1 sample.....	10.65	42.99	42.94	3.42	.62	1.00
17. Colville River, 1 sample.....	11.50	30.33	30.27	27.90	.50	1.00
18. Upper Yukon, Canadian, average of 13 analyses.....	13.08	39.88	39.28	7.72	1.26	.99
19. Upper Yukon, Circle province, average of 3 analyses.....	10.45	41.81	40.49	7.27	1.30	.97
20. Upper Yukon, Rampart province, average of 6 analyses.....	11.42	41.15	36.95	10.48	.33	.91
21. Seward Peninsula, 1 sample.....	21.92	38.15	33.58	3.35	.68	.88
22. Chitistone River, 1 sample.....	1.65	51.50	40.75	6.10	.....	.79
23. Kachemak Bay, average of 6 analyses.....	19.85	40.48	30.99	8.68	.35	.77
24. Nenana River, 1 sample.....	13.02	48.81	32.40	5.77	.16	.66
25. Kodiak Island, 1 sample.....	12.31	51.48	33.80	2.41	.17	.66
26. Unga Island, average of 2 analyses.....	10.92	53.36	28.25	7.47	1.36	.62
27. Tyonek, average of 4 analyses.....	8.35	54.20	30.92	6.53	.38	.58
28. Chistochina River, 1 sample.....	15.91	60.35	19.46	4.28	.....	.32

**DISTRIBUTION AND AREA.**

The known coal-bearing areas aggregate some 1,202 square miles, while the estimated areas of the coal fields are 12,667 square miles (see p. 182). The distribution of the coal, together with a symbol indicating its quality, is shown on Plate XII.



Besides showing the actual distribution of the areas believed to be underlain by workable coal beds (marked in black) the map also shows the areas of the coal fields, so far as they are known (marked by stippling). The difference in what is represented by these two symbols is that in the first are included areas in which there is a reasonable degree of certainty that commercial coal beds can be opened up, while the second indicates what is known of the probable extension of the coal fields, and hence defines the areas worthy of prospecting. It should be noted that this mapping does not by any means have the same value throughout the territory, for in some instances it is based on geologic surveys of a high degree of refinement; in others the data include only observations made during a rapid reconnaissance.

The coal fields can be considered under the three general geographic provinces already described: (1) The Pacific slope, (2) the central region, and (3) the northern. (See Pl. XII.) In the first are included the lignitic and bituminous fields of southeastern Alaska, Cook Inlet, the Susitna Basin, and the Alaska Peninsula, as well as the high-grade fuels of the Controller Bay and Matanuska regions. About 40 per cent, both of the area known to be underlain by coal and of the estimated area of the total coal fields of the Territory, falls in this province. It includes also at least 90 per cent of the known bituminous and higher-grade coals of the Territory. In considering this percentage of total coal area it must be remembered that this is the best-known part of the Territory, and there is, therefore, less likelihood of future discoveries of coal than in the less explored districts of central and northern Alaska. However, as over 50 per cent of this province is geologically almost unknown, there are possibilities that future surveys may lead to the discovery of more extensive coal-bearing areas.

The central province includes some bituminous and subbituminous coals on the lower Yukon, besides more extensive lignitic coal-bearing fields in the upper Yukon basin, near the coast line of Bering Sea, and elsewhere. Thirty-five per cent of the total known coal-bearing area falls in this province, and about 36 per cent of the estimated coal fields. At least 80 per cent of the central province, however, is almost unknown, so it is likely that further discoveries of coal will there be made.

The northern region includes the bituminous and subbituminous coals of the Cape Lisburne region, as well as lignitic and bituminous coal-bearing rocks in the Colville basin. These fields aggregate 24 per cent of the coal area of the Territory, and the area known to be underlain by coal forms 25 per cent of the total. This is a remarkable showing, in view of the fact that only about 10 per cent of this prov-

ince has been studied geologically. There is every reason to believe that there are extensive coal fields in this part of Alaska.

#### THE COAL FIELDS.

##### SOUTHEASTERN ALASKA.

Though Tertiary (or possibly Upper Cretaceous) coal-bearing rocks are known to cover a considerable area on the southern part of Admiralty Island and on adjacent islands, the included coal beds have only a remote fuel value. The beds are from a few inches to 2 or 3 feet in thickness, and the coal, so far as known, is of a low-grade lignitic character.

##### BERING RIVER.

One of the two fields containing the largest known amount of high-grade coal lies about 25 miles northeast of the small indentation of the southern shore line of Alaska called Controller Bay. The field is drained by Bering River, from which it received its name. This Bering River field embraces 21.6 square miles underlain by anthracite and 22.7 square miles underlain by semibituminous and semianthracite coal. The coal-bearing rocks trend to the northeast into the unsurveyed high ranges, and it is quite probable that there are considerable areas in the unsurveyed extension of the coal field or possibly other coal fields beyond the one surveyed.

The workable coal beds in this field vary from 6 to 25 feet in thickness, though local swellings occur, giving a much higher maximum. They are included in a great series of sandstones and shale of Tertiary age (Miocene?) which are closely folded and faulted. In quality the coals vary from an anthracite, with 84 per cent of fixed carbon, to a semibituminous, with 72 per cent of fixed carbon (see p. 175). The field includes some coking coal. There is no good harbor at Controller Bay, though plans have been made for building a breakwater. Another scheme of obtaining access to the coal is by constructing a railway from Cordova Bay, a good harbor lying 100 miles to the west. This railway is now (1908) about half completed.

##### COOK INLET.

Lignite-bearing Tertiary rocks occur widely distributed in the Cook Inlet region. These are usually little disturbed, but locally are considerably folded and faulted. The largest areas of coal-bearing rocks in this field occupy the western part of the Kenai Peninsula and are in part buried under a cover of Quaternary gravels. It is not impossible that the entire Cook Inlet depression may be underlain by the coal-bearing formations.

The best-known part of this field lies adjacent to Kachemak Bay on the north, where 2,000 to 3,000 feet of coal-bearing rocks are exposed. These contain an aggregate thickness of over 60 feet of

workable coal beds, the thickest of which is about 7 feet. Lignite in workable seams has also been found at Port Graham and Tyonek.

Though the Kenai Peninsula was the scene of the earliest (1854) coal-mining venture in Alaska, the output has been only a few thousand tons. These coals, in spite of their accessibility to tide water, can probably not compete with the higher-grade fuels, such as those of the Matanuska field. It seems probable that the coal reserves in the Cook Inlet region are very large, for the area of the coal field is estimated at 2,565 square miles.

#### MATANUSKA REGION.

The Matanuska coal field shares with that of Bering River the preeminence in the present fuel situation in the Territory. This field lies about 25 miles from tide water at Knik Arm, a northerly embayment of Cook Inlet. As, however, Cook Inlet is frozen during the winter months, the distance to tide water must be measured to the eastern side of Kenai Peninsula, about 150 miles.

The known commercially valuable coals of the Matanuska are included in folded and faulted rocks of Tertiary (Eocene?) age, including shales, sandstones, and conglomerates aggregating 3,000 feet in thickness. The coal-bearing series has been traced for 50 to 60 miles along the Matanuska Valley, but much of it is buried under a heavy blanket of Quaternary gravels. At the western end of the district the bituminous coal, which seems to form the main body of the field, appears to pass into a lignite, while there is some evidence that the same coal is represented by an anthracite at the eastern end of the belt. This anthracite may, however, belong to an older coal-bearing formation.

The commercial coals of the Matanuska field vary from a sub-bituminous to a semibituminous. There is also some anthracite, but of this less is known. It is evident from the facts in hand that there is a large amount of high-grade bituminous coal in this district. The beds vary from 5 to 30 feet in thickness.

So far as at present known, the total area underlain by commercial seams aggregates 46.5 square miles. As, however, much of the field is covered by gravels and as it has not been surveyed in detail, the coal-bearing area may be much larger. The total area of what may prove to be coal-bearing rocks is approximated at 900 square miles.

A railway is under construction which will lead to the opening of this field. This will bring about the development of the high-grade fuels, of which there is a large quantity. The lignites lying to the west of the Matanuska field will not now bear shipment until the coals of the higher fuel value approach exhaustion. As there is believed to be a very large amount of lignitic coal in this general province, it will be an important element of the ultimate fuel reserves of the Territory.

The widely distributed coal of the Alaska Peninsula and adjacent islands is in part of Cretaceous and in part of Tertiary (Eocene) age. It is chiefly lignite, but some good bituminous coals occur in this field. The rocks in which the coal beds occur are gently folded and locally, at least, considerably faulted. The total area of the coal fields of this province is estimated at 980 square miles, while that known to be underlain by coal is 61 square miles. About one-half of the coal-bearing area and about one-third of the probable coal field is lignitic, the balance varying from subbituminous to bituminous in quality. Coal has been mined in this field at Chignik and Herendeen bays and on the island of Unga for local use, but the total output has been only a few thousand tons. These coal fields are all readily accessible from good harbors and will form one of the early available fuel assets of the Territory when the demand for coals of this grade warrants their exploitation.

## YUKON REGION.

The coals of the Yukon, including bituminous and subbituminous, together with a large amount of lignite, are for the most part of Tertiary (Eocene?) age. Some of the bituminous may, however, be of Upper Cretaceous age. The Tertiary lignitic coal beds typically occur in association with conglomerates, sandstones, and shales, usually only little deformed, but sometimes profoundly folded and faulted. The bituminous coals, which are confined to the lower Yukon, occur with finer sediments, which have been gently folded and somewhat faulted.

The lignitic coal beds occur up to 20 feet in thickness, the bituminous in beds from 2 to 3 feet. These comparatively thin seams have not encouraged exploitation, in spite of the high price of mineral fuel in this central region, but a small production has been made for the use of the Yukon River steamers.

Coal-bearing beds are so widely distributed in the Yukon region that it will not be feasible to give an account of all the occurrences. The three largest fields are (1) Nulato region, (2) Nenana region of the lower Tanana Valley, (3) Washington and Coal Creek belt of the upper Yukon. Of these the Nulato field contains the best coal, while the Nenana is the most extensive and has the thickest beds. The total area known to be underlain by coal in the entire region is 264 square miles, while the coal fields may embrace 2,000 square miles or more.

These Yukon coals will have a high value for local use when the scant supply of accessible timber has been exhausted. There is a constantly increasing demand for power in the placer districts, and this can be met only by developing the water powers, which are not extensive, or by utilizing the coals. The low fuel values and the

difficulties of transportation of these coals will probably lead to their local transformation into electric power, to be transmitted to the mining camps. The location of some of the lignite fields with reference to the placer fields is well suited for this purpose.

That a large amount of lignite in excess of any future local demand that can now be foreseen occurs in the Yukon region can not be denied. So far as exportation is concerned, it is certain that the low fuel value of these coals and their inaccessibility will lead to their conservation until the fuel supply of other regions approaches exhaustion.

#### SEWARD PENINSULA.

The known coal-bearing areas of Seward Peninsula do not exceed a few square miles, and the quality of the coal is of a low grade. This coal, however, is worthy of mention, because it can probably be locally utilized to furnish power for mining purposes, and hence conserve the higher-grade coals which are now being brought in from outside sources. This appears to be a good example of the way a local supply of lignite may reduce the consumption of higher-grade fuels. Its success will depend on the development of economical means of utilization of these low-grade fuels, so as to bring them within the sphere of commercial practice and permit their substitution for higher-grade fuels transported from a distance.

#### NORTHERN ALASKA.

Geographically, the known coal fields of northern Alaska fall into three groups: (1) Cape Lisburne, (2) the Colville Valley, (3) Wainwright Inlet. Coal has also been reported to occur between these areas, as well as east of the Colville River. The Cape Lisburne field includes the Corwin and Cape Beaufort districts.

Three coal-bearing formations are recognized in this northern field: (1) lower Carboniferous (Lisburne formation), made up of slates, shales, and limestones, with some high-grade bituminous coals, and having a thickness of 500 to 600 feet; (2) Jurassic (Corwin formation), including at least 15,000 feet of shales, sandstones, and conglomerates and containing a large number of subbituminous coal beds; (3) Tertiary (Kenai formation?), made up of conglomerates, sandstones, and shales, with lignitic coal seams. The two lower formations are considerably folded, but the Tertiary beds are, as a rule, only little disturbed.

The total area known to be underlain by coal aggregates 302 square miles, while the coal fields, roughly outlined from the data in hand, include some 2,000 square miles. The scant evidence at hand points to the conclusion that a survey of this northern region will show very large coal fields in this part of Alaska.

A little mining of coal for local use has been done in the bituminous field near Cape Lisburne and in the lignitic field of Wainwright Inlet, but the region as a whole is practically untouched. It

is certain that there will be no extensive mining in this northern field for a generation or two to come. These coals are too inaccessible to invite exploration, either under the present demands or any that can now be foreseen.

#### THE COAL RESERVES.

##### INTRODUCTION.

It will be evident from the facts presented that there are few data on which even an approximate idea of the available tonnage of Alaskan coal can be based. Of the 1,238 square miles believed to be underlain by coal, less than one-quarter has been surveyed in sufficient detail to yield any quantitative data whatever. Even where such surveys have been made, a large factor of uncertainty is introduced either by the folded and faulted condition of the coal beds, which exists in some fields, or by the lack of definite knowledge of the continuity of the coal beds in others. There must, therefore, be a very large element of uncertainty in the tonnage estimates of the 300 to 400 square miles of surveyed coal fields. Moreover, in Alaska there are practically no available data from private sources, such as the results of extensive mining or prospecting operations, which have formed an important element in the estimates made of the mineral resources in the States.

The estimates of tonnage to follow were made on the following basis:

1. No beds less than 3 feet thick were assumed to be workable or to contribute to the tonnage.

2. The depth of workability was assumed to be 3,000 feet in the case of the highest-grade coal (anthracite, semianthracite, semibituminous), 2,000 feet in case of the better bituminous and subbituminous coals, such as those on the lower Yukon and at Cape Lisburne and on the Matanuska River, and 1,000 feet in the case of the poorer subbituminous and all the lignites.

3. The tonnage was computed by the following formula: Tonnage = area of bed to limit of workability (square miles)  $\times$  thickness (inches)  $\times$  sp. gr.  $\times$  72,600.

4. The specific gravity was assumed to be 1.30 for lignite, 1.35 for bituminous, and 1.38 for the high-grade coals.

5. Bering River field: A certain percentage of the coal-bearing rocks is shown by the average sections to consist of workable coal beds. This percentage of the computed bulk of rock to limit of workability gave the estimated tonnage.

6. Nenana coal field: As for Bering River, with the necessary change for percentage of coal in rocks.

7. Matanuska coal field: Each bed was estimated separately according to its average thickness, length according to a safe assumption of continuity, and width on the dip to the limit of workable depth.

8. Lisburne fields: The Corwin district was computed like the Matanuska, length of beds being assumed to be the distance from the shore to the edge of the area colored on Collier's map. The Beaufort district was assumed to have one-half the tonnage per square mile of the Corwin district.

9. Yukon field: Each bed figured as in Matanuska, but the beds were not assumed to extend in any case more than 1 mile in each direction from the mine or prospect where they had been exposed, except in the Washington-Bonanza district, where a continuity of 50 miles on the strike was assumed.

10. Cook Inlet field: Computed as for the Matanuska.

All the other fields were estimated on the basis of a most conservative estimate of thickness of coal underlying the field and an area believed to be a safe minimum. Neither in this case nor in any of the others was the coal assumed to go beyond where we have reliable information from members of the Survey concerning it. The areas used in making the last class of estimates are consequently very small and are subject to a possible immense extension in the light of subsequent work.

*Estimate of tonnage and areas, Alaska coal fields.*

	Tonnage	Areas devoted to coal underlying by coal	Supposed area of coal fields.
	<i>Short tons</i>	<i>Sq. miles</i>	<i>Sq. miles</i>
Anthracite, Pacific coast	1,661,000,000	21.8	
Semianthracite, Pacific coast	517,000,000	7.2	
Semibituminous			
Pacific coast	1,445,800,000	15.8	
Arctic slope	66,800,000	14.2	
Total semibituminous	1,512,600,000	30.0	
Total high-grade	3,684,400,000	83.0	6.7
Bituminous			
Pacific coast	2,000,000,000	2.0	900
Interior region	15,000,000	162.0	2,475
Total bituminous	15,200,000	164.0	1,575
Subbituminous			
Pacific coast	535,000,000	49.7	65
Interior region	79,200,000	6.0	1
Arctic slope	5,065,000,000	265.0	1,125
Total subbituminous	4,680,000,000	260.7	1,965
Lignite			
Pacific coast	2,174,100,000	337.0	2,938
Interior region	4,228,000,000	264.5	2,003
Arctic slope	1,003,200,000	91.0	1,750
Total lignite	7,405,300,000	692.5	6,697
Summary by provinces:			
Pacific coast	6,265,800,000	457.5	5,115
Interior region	4,933,100,000	432.5	4,493
Arctic slope	4,535,000,000	312.2	3,059
Grand total	15,734,900,000	1,202.2	12,667

The incompleteness of these figures can best be illustrated by some examples. The Bering River field may be extended into the mountains and have many times its present known area. If the entire eastern and western extensions of the Matanuska Valley are underlain by coal beds, as may be the case, it will increase the tonnage of this field many times that used in the present estimate. In the Cook Inlet and Susitna regions the estimates for tonnage are based on a coal field of 30 to 40 square miles. As a matter of fact, it is not improbable that the whole Cook Inlet-Susitna depression may be underlain by coal-bearing rocks at no depth prohibitive of mining. If this is the case, this coal field might embrace 10,000 to 20,000 square miles.

In view of these facts, it is perhaps conservative to multiply the above figures by 10 or even by 100 to arrive at an approximation of the fuel reserves of this vast unexplored region. This is especially true of the lignite reserves, for there are known to be very extensive fields of low-grade coals in Alaska.

#### PRODUCTION AND CONSUMPTION.

Though an attempt at mining coal on Cook Inlet in 1854 by the Russians was the first mining undertaken in the Territory, yet the total output up to the present time has been very small, as indicated in the following table. In 1907 there were four productive coal mines in Alaska.

*Production of coal in Alaska, 1888-1907.*

Year.	Short tons.	Value.	Year.	Short tons.	Value.
1888-1896 <i>a</i> .	6,000	\$84,000	1903.	1,447	\$9,782
1897.	2,000	28,000	1904.	1,694	7,225
1898.	1,000	14,000	1905.	3,774	13,250
1899.	1,200	16,800	1906.	5,541	17,974
1900.	1,200	16,800	1907.	10,139	53,600
1901.	1,300	15,600			
1902.	2,212	19,048	Total.	37,507	296,079

*a* The production for 1888-1896 is estimated on the best data obtainable. That for the years subsequent to 1896 is based for the most part on data supplied by operators.

The smallness of the output is chiefly due to two reasons: First, because up to a decade ago, when the rapid advancement of the gold-mining industry began, the local demand for coal was very small, being confined to that of the canneries and shipping interests and the Treadwell mine, which could be supplied at low cost by the fuels brought from Vancouver Island or Washington. Second, the existence of extensive bodies of high-grade coal in Alaska, geographically situated so that it could be exported, has been generally known only for a few years. Since the discovery and surveys of the Controller Bay and Matanuska regions there has been much activity looking to



the development of these two fields. As, however, the marketing of this coal requires the construction of 150 miles of railway in one field and 100 miles of railway or 25 miles of railway and possibly an expensive breakwater in the other, the progress of exploitation is necessarily slow. Moreover, the uncertainty of obtaining title to coal lands, which still exists, has made capitalists rather guarded in furnishing the money necessary for these enterprises.

Though the Territory has produced annually only a few thousand tons, the consumption of coal during the past decade has rapidly increased. The following table presents the available statistics regarding consumption of mineral fuels in Alaska:

*Shipments of coal and coke to Alaska, July 1, 1903, to June 30, 1907.<sup>a</sup>*

	Twelve months ending June 30,		1903,		1904,		1905,		1906,		1907,	
	Quantity,		Quantity,		Quantity,		Quantity,		Quantity,		Quantity,	
	Tons,		Tons,		Tons,		Tons,		Tons,		Tons,	
	Value,		Value,		Value,		Value,		Value,		Value,	
Domestic anthracite.....			5	885					476		87,000	
Domestic bituminous.....	41,704	\$193,730	42,375	187,142	67,294	\$265,047	48,383	230,651				
Domestic coke.....	332	2,253	438	4,781	316	3,676	3,508	20,629				
Foreign anthracite.....			10	118	394	1,846	23	216				
Canadian bituminous.....	66,142	\$1,987	59,252	20,130	41,481	187,312	64,629	287,948				
Australian bituminous.....	1,000	4,093					3,629	8,887				
Japanese bituminous.....							11,606	51,784				
Foreign bituminous, shipped via United States.....	3,334	25,064	3,530	29,674	706	4,838	4,141	28,670				
Foreign coke.....					7,628	28,130	2,300	14,795				
Total.....		116,811	186,184	617,880	181,577	111,718	200,818	1,181,106	677,384			

Commerce of the Incorporated Territory of the United States, Bureau of Statistics, 1904, 1905, 1906, 1907.

<sup>a</sup>At point of shipment.

*Shipments of petroleum to Alaska.<sup>a</sup>*

Period	Crude petroleum			Naphtbas	
	Gallons	Barrels	Value	Gallons	Value
Six months ending—					
December, 1902.....	21,000	500	\$300	60,658	\$812,186
June, 1903.....	840,000	20,000	28,000	210,147	33,830
December, 1903.....	1,008,000	24,000	36,000	84,776	18,054
June, 1904.....	1,008,400	24,010	35,823	241,658	43,814
December, 1904.....	1,008,050	24,001	33,403	106,623	23,904
June, 1905.....	1,780,326	42,389	50,201	490,196	75,187
December, 1905.....	935,060	22,263	31,864	214,300	34,734
June, 1906.....	1,428,000	34,092	20,400	361,681	60,214
December, 1906.....	1,200,100	30,000	18,000	219,267	40,480
June, 1907.....	2,545,200	60,000	36,360	354,210	59,012
December, 1907.....	6,558,500	156,155	107,146	282,671	60,333
June, 1908.....	3,852,940	91,736	55,482	599,950	91,084

<sup>a</sup>Monthly Summary of Commerce and Finance, Bureau of Statistics, 1902-1906.

The advancement of copper and gold mining, construction of railways, etc., will cause a constantly increasing consumption of coal. It would appear to be in accord with a policy of conservation of mineral fuels to meet this demand from the local supply. Every ton of coal or barrel of petroleum shipped to Alaska by steamer or rail entails a certain amount of fuel consumption for transportation. Moreover, this long carriage is commercially possible only for high-grade fuels, while for local consumption the large supply of lignites of lesser fuel value can be utilized. For example, many of the Alaskan river steamers, now using California petroleum as fuel, could be supplied by the local lignites. This would prevent a double waste: (1) The more valuable fuel is consumed instead of the more abundant lignite, and (2) as the petroleum is brought nearly 4,000 miles by steamer, fuel is used for its transportation. The utilizing of the coals in the Yukon region as a substitute for wood would also conserve the scant supply of timber.

Again, the use of the local coking coals for the reduction of the copper ores will effect a saving of mineral fuels. At present the copper ore is shipped a distance of 500 to 1,500 miles, while if it were smelted near its locality of production 70 to 90 per cent of the material could be left behind, with a corresponding saving of fuel used in transportation. Another saving would be brought about in the case of Alaska steamers now carrying coal from the southern ports for the round trip, if the local fuels were utilized for the return journey.

Discussion of the future utilization and conservation of Alaska's coal supply can best be made by considering separately the same three geographic provinces under which the coal fields have been described: (1) The Pacific slope, (2) the central regions, (3) the northern region. These will here be considered in the reverse order in which they have been given.

The northern coal fields lie in a region tributary to the Arctic Ocean, which is locked in the ice for all but two or three months in the year. Some lie close to the seaboard; others far inland. While little is known of the fuels of this region, all the facts available point to the conclusion that this province contains very extensive coal fields. These mineral fuels are in a region where there are practically no industries and little promise that any will be developed, and the coals are unavailable until the more accessible mineral fuel supply of the world approaches exhaustion. To bring them to a harbor open throughout the year would mean the construction of at least 1,000 miles of railway. Such a haulage, leaving out all other

considerations, is of course prohibitive for any present fuel demand. Moreover, these coals are not needed, nor likely ever to be, for any local use, except some of those at Cape Lisburne, which may be utilized for local shipping, and some others which may be used by the scant Eskimo population, now that the supply of driftwood is approaching exhaustion.

The fuels of this northern region can, therefore, be regarded as conserved by the geographic conditions until future generations may have to draw upon them. They can consequently, for the most part, without injury to any existing commercial interests and without retarding the development of the country, be placed under such legislative provisions as will permit their utilization only under such restrictions as the future conditions of the mining industry shall demand.

The coals of the central region are in part accessible to rivers navigable during the summer months and in part lie near the proposed railways from the Pacific to the Yukon. There also remains a considerable percentage but little more available to the present generation than the fuels of the northern fields. These coals are chiefly lignitic in character and, under no demand which can now be foreseen, could be utilized for export to other districts. To bring them to the States would require a railway haulage of 400 to 500 miles and then transportation by steamer for 1,000 to 1,500 miles in addition.

On the other hand, the development of these fields to supply the local demand will conserve (1) higher-grade fuels now imported from great distances and (2) local supply of timber. While little is known of the amount of coal available in this central province, there is every reason to believe that it is far beyond any local demand of the future.

The conservation of the coal of the Pacific slope province is a more complex problem, both because of the high grade of some of the fuels and of their greater accessibility. While none has yet been exported, the great demand for the high-grade bituminous and anthracite coals, such as are found in the Controller Bay and Matanuska regions along the Pacific coast, will lead to their exportation as soon as railways make them accessible. It is probable that the market for these coals will for a long time exceed the production, which will greatly stimulate mining activity once the transportation problem has been solved. When the coals are put on the market, they will probably curtail, if not entirely cut off, the demand for the lignitic and lower-grade bituminous coals which are so abundant in the Pacific coast province of Alaska. Therefore the production of the high-grade fuels will effectually conserve those of lesser fuel value for the present. Some of these low-grade fuels, however, are

so accessible and so abundant that future demands and strong competition may lead to wasteful methods of mining, provided they are all permitted to pass into unrestricted private ownership.

The reserve of these anthracite and bituminous coals of the Pacific slope, while it can not now even be approximated, in all probability is far below that of the lignites. It seems probable that an extensive area of the high-grade fuels may be found among the high mountains and glaciers to the northeast of the present known limits of the Bering River field. If such be the case, this will be another locality where the geographic conditions will prevent mining until there is far more demand for the fuel than at present. In the Matanuska there is probably also a large quantity of coal under the Quaternary coating of gravel. Making allowances for future discoveries, however, the high-grade fuel is not abundant, considering the demand for it.

From the standpoint of conservation and economic utilization, the possibility of intense competition between the coal of the Bering and Matanuska fields and that of Puget Sound is the danger point in the prospective situation. If each field develops only to the extent of supplying the demand for the kind of coal which it best can furnish, then the immediate use of the coal will be legitimate and economical. But if the individual fields develop beyond the demand of their respective proper markets—if the Bering River field produces more than the needed supply for steamship, smithing, and local railway and smelting needs and of domestic anthracite, if the Matanuska produces more than is needed for its local railways and smelters, for bunker coal at its tidal terminus, and for shipment to the Pacific coast coke ovens, and if the coal from other fields invade these markets—there is sure to be ruinous competition, which may lead to cutting prices with the sole object of destroying all competition and establishing a general monopoly. In such ruinous competition as has existed in some of the eastern fields the coal fields will be robbed of the more cheaply minable coal at the cost of the destruction of larger amounts which will be left in the ground so crushed and buried that it can never be recovered, coke for distant shipment will be made by wasteful processes at the mines instead of shipping the coal to points where both the coke and the by-products can be used, coal will be coked which would better be used for other purposes, and the waste by consumption en route will be extended to the Alaska coals.

If these high-grade fuels, some of which make excellent coke, are not exploited, several conditions will probably be brought about:

First. The west coast of the United States will probably continue to draw heavily on the fuels of British Columbia, Australia, and Japan, and to the amount imported will conserve its own supply.

Second. There will be an increasing demand for fuel oils, which, while it may not affect the production, will stimulate the search for new oil fields.

Third. The west coast will probably continue to rely on the East for its pig iron and steel, for in the absence of good cheap coke—except as Alaska can supply it or the processes of coking coals are improved—the local supplies of iron ore will not be utilized, unless, possibly, by electrical methods of smelting. As a concomitant to this, the iron ore and coking coals of the East, which are of the most value to the nation, being nearest the centers of the population, will be correspondingly diminished.

Fourth. What has been said of the relation these coals bear to the development of an iron industry on the Pacific coast is to a lesser extent true of copper smelting. Without the use of Alaska coke either the copper ores will be transported to British Columbia or Puget Sound or the coke will be brought to the copper deposits. In either case there is a loss in transportation. While it is true that these factors will affect the copper-mining industry and lead to the exploitation of only the richer deposits, yet the past few years have shown that it is economically possible to bring either the coke to the copper or the copper to the coke.

Fifth. Certain loss of fuel in transporting eastern coals to the west coast for certain purposes where their use is imperative will continue. This is, however, a small item, as the total tonnage of eastern coals to the West is insignificant.

Sixth. There will be no local supply of high-grade coals on the west coast for the use of the navy.

In considering the above facts it must be remembered that these Alaska bituminous and anthracite coal fields can be made accessible only by the expenditure of a very large amount of money. The millions of dollars necessary for the development of these fields will not be forthcoming unless provision be made by which a large tonnage of coal will be made available.

#### PEAT.

Peat is found in nearly every part of Alaska except in the high ranges. The humidity of the Pacific coastal zone and the consequent luxuriant vegetation favors the accumulation of peat. Southeastern Alaska is heavily forested and often has dense growth of underbrush with a flooring of moss. In southwestern Alaska timber is entirely absent, but all the lowland and much of the upland regions are covered with moss, grass, and small shrubbery. The prevailing humidity in both these districts favors the accumulation of vegetable refuse. Though there has been no prospecting for peat in this part of the Territory, deposits are known at least 15 to 20 feet in thickness and are believed to be of good quality.

Central and northern Alaska have a much smaller precipitation. Here, however, the soil is nearly everywhere mantled by a dense blanket of moss and other vegetation. This is especially striking in the extensive timberless areas or tundras which lie along Bering Sea and the Arctic Ocean. In these two provinces the subsoil is usually frozen, which retains the waters at the surface. The moss, except in excessively dry weather, is usually saturated with water. All these conditions, which promote vegetable growth and retard evaporation and oxidation, are favorable to the formation of peat. As a matter of fact, there is nearly everywhere a layer of peaty material underneath the soil. In some natural exposures peat deposits have been observed in these provinces having a depth of 30 to 40 feet. While the widespread surface layer of peat is of an inferior quality, some of the deeper-lying beds are probably of high grade. There are no data whatever at hand to estimate the available supply of peat. As, however, it is found in every part of the Territory and on the great tundras of the north, occupying at least a quarter of the Territory and comprising layers of greater or less thickness, the supply must be enormous and possibly exceeds that of the entire United States.

In the presence of more easily available fuel there has been no occasion to utilize any of the peat beds, so practically nothing is known of their fuel value, extent, or thickness, except what has been stated. Probably the only place in Alaska where this mineral fuel has been exploited is a peat bed saturated with petroleum residue, near Cold Bay, on the Alaska Peninsula, where the material has been used for fuel at the neighboring oil drills. Here, however, it is the petroleum residue rather than the peat which gives the deposit its chief value.

The peat deposits have at present no value, since lignitic and better-grade coals are too widely distributed to encourage the use of a less available fuel. The time appears also very remote when these peat deposits (except at localities where coal is absent) will be utilized. Certainly recourse to the peat will take place only when the more valuable mineral fuels are not obtainable.

#### PETROLEUM.

By G. C. MARTIN

Petroleum may exist in the rocks at many places in Alaska, but at only four localities are the known indications sufficient to justify drilling. Wells have been drilled at three of these localities, but petroleum has been obtained in quantity at only one of them. In all of these the petroleum is of the high-grade variety, suitable for refining, like that from Pennsylvania. These four will be briefly described.

The Katalla field is situated near the mouth of Copper River, in latitude  $60^{\circ}$  north, longitude  $144^{\circ}$  west, or about 1,250 miles northwest of Seattle and 400 miles northwest of Sitka. The rocks in this field consist of Tertiary shale, sandstone, and conglomerate. The structure is complex, the rocks being steeply and intricately folded and cut by faults. These conditions would raise doubt concerning the existence of bodies of oil if it were not for the abundant seepages and the presence of oil in the wells. As it is, they increase the cost and other difficulties of drilling and make it entirely impossible to estimate the area of the probable oil-producing territory.

Sixteen wells have been drilled in the Katalla field. The result has been a moderate production of oil from one well and the demonstration of smaller quantities in three others. As only a small part of the area in which the presence of seepages suggests an oil field has been drilled, the proof of the existence of any considerable volume of oil is yet to be made.

The Cook Inlet oil fields are about 320 miles west of Controller Bay on the middle part of the west shore of Cook Inlet. Seepages are here numerous and prolific, but though several wells have been drilled, none has yet proved successful. This field is in an area of Jurassic rocks which are chiefly shales and sandstones. The folding is much more moderate than at Controller Bay, but many faults are present. The relation of the occurrence of oil to the geologic conditions has not been discovered, and hence the areas of possible oil-producing territory are entirely problematical.

At Cold Bay, on the Alaska Peninsula, 160 miles southwest of the Cook Inlet fields, there are many large seepages and several wells have been drilled, none of which has produced more than traces of oil. Here, as in the Cook Inlet field, the rocks are chiefly Jurassic shales and sandstones. The structural conditions are not unlike those on Cook Inlet.

Near Cape Yakataga, 75 miles east of Controller Bay, many large seepages are reported, but owing to the unaccessibility of the region no drilling has been attempted. These seepages are located on Miocene shale and sandstone which are steeply folded.

Summarizing, it may be said that the occurrence of oil is suggested under considerable areas in Alaska, but the presence of profitable oil pools has yet to be shown. The low price of oil on the Pacific coast and the high cost of drilling in Alaska make any attempt to develop the possible Alaska fields at present an unattractive proposition.

All considerations point to the desirability of conserving the Alaska fields until the decline of the California and Mid-Continent fields. When Alaska oil is utilized it should be for refining, and the burning of crude Alaska oil should be discouraged.

## IRON ORES.

There being now practically no demand for iron ores on the west coast, such ores have not been sought for in Alaska. The only iron which has been found is that discovered incidentally in prospecting for other minerals, and thus far this has been chiefly magnetite, occurring at only a few localities along the Pacific seaboard. The following note on these deposits has been prepared by C. W. Wright:

Magnetite is the only iron ore that has been found in southeastern Alaska in commercial quantities. This ore occurs in large bodies, forming contact deposits along the contacts of diorite and limestone on Prince of Wales Island, where it is associated with the copper deposits, and occurring as magmatic segregations associated with basic intrusive rocks at several points along the mainland coast.

At the copper mines of Prince of Wales Island a considerable tonnage of magnetite carrying from one-half to  $1\frac{1}{2}$  per cent of copper has been developed which can not be profitably mined as a copper ore. However, if there were a market for the iron in these ores, the copper could be readily separated mechanically and the deposits mined with profit. The surface showings of magnetite in this copper district are very large, and the estimated tonnage, with a depth of only 30 feet, is about 3,000,000 tons of magnetite. There is, of course, a much greater amount of possible ore, concerning the extent of which almost nothing is known. These ores for the most part contain practically no phosphorus or detrimental impurities, and may be classed as Bessemer ore.

Explorations have been begun to develop magnetite deposits near Haines, on the mainland coast of Lynn Canal, but little is known as yet of the extent or the character of the ores.

U. S. Grant, in his study of the copper deposits of Prince William Sound, noted some hematite ores, but could not determine whether the ore was present in commercially valuable deposits. He also reports the occurrence of magnetite associated with pyrrhotite on Prince William Sound and with chalcopyrite near Seward, on the Kenai Peninsula. His investigations, on the whole, do not encourage the idea of the presence of workable iron ores in this district.

In the Iliamna Lake region there are some copper deposits which from accounts, appear to be of similar origin to those of Prince of Wales Island. With these is said to be associated a large amount of magnetite. So far as known, iron-ore bodies have been found at only one place in the interior. At this locality, which is near the head of the Nabesna River, there is a  $2\frac{1}{2}$ -foot vein of magnetite which occurs in a limestone near the contact with an intrusive.

The conditions of occurrence of both types of southeastern Alaska magnetite deposits probably repeat themselves along other parts of the Pacific coast line, so that there is a probability that similar bodies of iron ore occur elsewhere. Though the evidence is very scant, it is not impossible that Alaska may have important iron-ore reserves.



## GOLD.

### INTRODUCTION.

Mr. Lindgren's general report on precious-metal resources of the United States, contained in this volume, emphasizes the fact that no definite statement of the gold reserves is possible. If this be true of the United States, it is far more so of a little-known region like Alaska, where the auriferous deposits have been found in widely distributed districts, usually separated by extensive areas, often but little prospected, sometimes almost unexplored. Moreover, except in southeastern Alaska, the auriferous deposits thus far developed are primarily those of the alluvium, and there has been little search for lodes. Therefore, in most of the gold-placer districts the possibilities of developing an auriferous lode-mining industry are almost unknown.

Geologic survey and investigation, when executed with sufficient thoroughness, lead to definite results concerning the distribution and occurrence of auriferous deposits. If a region has been mapped in detail, the geologist can outline with a fair degree of certainty those areas worth prospecting for gold. Such investigations, however, can be interpreted quantitatively only to a very limited degree in reference to placers and are practically worthless for the purpose of forecasting the gold content and reserves of undeveloped lode deposits.

The actual valuation of developed lode deposits can, of course, be carried only to the limits of the mine workings, which permit the blocking out and sampling of the ore bodies. Such an investigation can be made only at great cost and is properly the function of the mine owner and not the federal geologist.

Placer deposits, whose values are far more regular of distribution, admit of a rough valuation by the geologist; but even in the case of placers the quantitative determination of gold contents in any given body of gravel can be arrived at accurately only by extensive excavations or drilling, and by sampling. This also is evidently the function of the mine owner and not of the federal geologist. Most Alaska placer miners have done so little careful prospecting of their properties as to make their statements in regard to metal contents of but little service in estimating the placer gold reserves. Such data as are available have been carefully compiled by the Geological Survey, but while they may have value in forecasting the direction of future mining development, they are far too inexact and incomplete to admit of more than a bold guess at the gold reserves. Any estimate made at the present time can not take into account the latent possibilities of the hundreds of creeks which, though unprospected, are believed to lie within the gold-bearing area.

In the following account emphasis will be laid on the subject of general distribution and occurrence of the auriferous deposits, because it is believed that such data form the most important element in the valuation of these deposits. Given this information, together with a statement of past production, the technician at least is able to draw his own conclusions.

#### GEOLOGIC AND GEOGRAPHIC DISTRIBUTION.

##### GENERAL STATEMENT.

The known gold deposits of Alaska can be grouped into three general types: (1) Gold occurs near the contacts between granitic or other igneous intrusions and altered sediments. (2) It occurs in metamorphic schists. (3) It occurs in association with Mesozoic or Tertiary volcanics. Nearly all of the auriferous lodes which have thus far been productive are of the first type, while the second appears to be typical of most of the important placer districts. Examples of the third type have been so far limited to only a few localities. There is some evidence to indicate that the source of the gold of the placers occurring in areas of schistose rocks may be in veins which bear a genetic relation to, as well as a close association with, igneous intrusives. If this proves to be generally the case, it may be found that the deposits assigned to the first two groups may be practically identical in origin.

Most of the auriferous deposits occur in rocks which have been more or less highly altered, but the metamorphism in the placer districts has usually been more pronounced than in lode districts. There are no considerable areas of metamorphic rocks known in Alaska which are not locally more or less auriferous, so that the distribution of these rocks is one of vital importance to this discussion. The metamorphic terranes vary in age from Cambrian or pre-Cambrian to Carboniferous and possibly Triassic. There are also some altered Cretaceous beds which are locally auriferous. While in Alaska their geologic age has little direct bearing on the question of the distribution of gold, yet the most important gold fields now developed are in regions where the rocks belong chiefly to lower Paleozoic or older terranes.

Three considerable belts of metamorphic rocks traverse the Territory. One of these skirts the Pacific seaboard, embracing the auriferous lode and placer districts of southeastern Alaska (see map, Pl. XII), the Prince William Sound copper district, and some small gold-bearing areas lying in between. Its southwestward extension is found in the Kenai Peninsula and on Kodiak Island, where it includes some placer and lode deposits.

A second belt stretches southwest from the international boundary, near the famous Klondike district, and includes the Fortymile, Birch

Creek, Fairbanks, and other gold placer-bearing areas. Its extension is probably to be sought in the little-explored region lying between the lower Yukon and the Kuskokwim, and may include the newly discovered placers of the Innoko Valley.

The third belt lies north of the main Yukon Valley, includes the gold placers of the Chandalar, Koyukuk, and Kobuk districts, and may find its continuation in the auriferous metamorphic rocks of Seward Peninsula.

In addition to these broad belts thus defined, there are some smaller areas in which gold has been found, such as those of the Nizina, of the Chistochina, of the Yentna, of the Bonfield, and of the Kantishna districts. These, with others, which will not be enumerated, have yielded some placer gold.

#### SOUTHERN ALASKA.

The auriferous deposits of southeastern Alaska have been investigated by C. W. and F. E. Wright and A. C. Spencer, from whose reports the following data are drawn: This province is the one in which the close association of the metalliferous lodes with the intrusives is most strongly marked, and where this relation was first worked out. It appears that the strongest mineralization lies close to the western margin of the great intrusive masses of the Coast Range. Similar intrusives are, however, widely distributed in isolated stocks throughout the coastal region of this part of the Territory and its adjacent islands, and these, too, have been found to be mineralized at a number of localities. As there are hundreds of miles of these contacts, and as but few of them have been carefully prospected, the chances of finding additional auriferous lodes appear to be good. At the same time it should be noted that the mere fact of mineralization does not imply the existence of valuable deposits, and that, in spite of the fact that this part of Alaska has been the scene of active mining for nearly thirty years, only the Juneau district has furnished any considerable gold output, and this has chiefly come from the three mines of the Treadwell group. In the Ketchikan district, embracing the southern part of southeastern Alaska, there has been some exploitation of auriferous lodes. Though some of these have carried high values, they are all comparatively small, and many have proved not very persistent.

The value of the total gold output of southeastern Alaska from 1880, when mining first began, to the close of 1907, was nearly \$40,000,000, which has come chiefly from the lodes. Its future as a gold producer is promising, yet, excepting the few developed mines, there is but a small tonnage of ore in sight. With the densely forested conditions that prevail, the search for ore bodies has been much impeded, and in spite of its accessibility the region can not be said to

222

There is therefore little on which to

base predictions of future production, except the geologic conditions which are favorable to the discovery of new ore bodies. The deepest workings (1,600 feet in the Treadwell mine) indicate a persistence of gold content in deposits of this type which is encouraging.

#### ST. ELIAS RANGE.

Auriferous sands whose materials have been derived from the metamorphic rocks of the St. Elias Range have been found and mined in a small way at a number of localities. These and what is known of the rocks of this range suggest that here may be a locus of future gold mining, but the facts at hand do not permit a definite statement.

#### KENAI PENINSULA AND KODIAK ISLAND.

Auriferous gravels have long been known to occur on the Kenai Peninsula. In fact, it was here that the Russian mining engineer Doroshin found the first placer gold (1884) known in Alaska. The placers of the northern part of the Kenai Peninsula have been productive since 1895, with an aggregate output valued at about \$2,000,000. For several years, however, the production has fallen off, and it appears that the richest of the known gravels have been exhausted, though there are extensive bodies of alluvium carrying low values. The gold has been derived from metamorphic rocks, and intrusives appear to be absent. The same geologic conditions appear to prevail throughout the eastern part of the peninsula, and other discoveries may be made. Both in the Kenai Peninsula and on Kodiak Island, which lie in the same general geologic province, some auriferous lodes have been found. The accessibility of this region would permit the mining of low-grade ores, so that there is a possibility of a gold production from this district even after the placers have become exhausted.

#### SUSITNA BASIN AND ALASKA RANGE.

Auriferous gravels are widely distributed in the Susitna basin and have been found on both flanks of the Alaska Range. It is only within a few years that workable placers have been found, and the entire production does not exceed a few hundred thousand dollars in value. The geologic conditions in the Alaska Range are in some respects very similar to those of southeastern Alaska and are therefore favorable for the occurrence of auriferous deposits. In view of the unexplored condition of much of this field, it is useless to attempt any forecast of its future from the mining standpoint.

#### COPPER RIVER BASIN.

There are two widely separated auriferous areas in the Copper River basin. The northern area lies on the south flank of the Alaska Range, and the southern area is a western extension of the St. Elias Mountains. What has been said of the future of mining in these

range applies to these districts excepting that they are not producing gold output from these, and they will undoubtedly continue to produce, as systematic mining has hardly commenced.

#### ALASKA PENINSULA AND ADJACENT ISLANDS.

The Alaska Peninsula region furnishes the only developed example of the third type of auriferous deposits, namely, an occurrence in volcanic rocks. This is at the Apollo mine, which has made a considerable production. Recent information leads to the opinion that there are other similar types of deposit in this general region. If such prove to be the case, this district may also swell the gold production, though at present its entire annual output is confined to a few thousand dollars taken from beach placers and a small production from lode deposits.

#### YUKON BASIN.

Mining was begun in the Alaska Yukon about 1887, when the Fortymile placers were discovered, but the total production up to the time of the discovery of the Fairbanks placers in 1901 was less than \$6,000,000 in value, whereas the production for 1901 to 1907, inclusive, is valued at nearly \$30,000,000.

The best known and probably most valuable of the placers of the Yukon basin lie in the so-called "Yukon-Tanana region," embracing an area of some 40,000 square miles between the two rivers, of which about half falls in what may be designated the "auriferous zone." Within this province lie the Fortymile, Birch Creek, Fairbanks, Rampart, and Hot Springs districts, as well as some smaller ones, all of which have produced placer gold.

This province is the best example of gold occurring in metamorphic schists, but some of its auriferous deposits appear to be intimately associated with intrusive rocks. So far as known, the geologic conditions which prevail in the developed placer districts persist over much of this field. Certain it is that auriferous mineralization is widely distributed, for fine particles of gold occur nearly everywhere in the alluvium. Much of the Yukon-Tanana region is so inaccessible as not to attract the large operator. While the bonanza hunter has hurriedly traversed most of this region, the scarcity of bed-rock exposures and other conditions adverse to prospecting prevent such hasty investigations from yielding definite results as to the presence of gold deposits. Even in the best-known and most accessible parts of the region new discoveries of placers are constantly being made. All these facts indicate that this may be one of the largest placer-gold reserves of the Territory.

The data bearing on the gold contents of the gravels known to carry values have been carefully assembled by L. M. Prindle and F. J. Katz, and these indicate a reserve of about \$100,000,000 in value for the ground which has been more or less prospected. This is cer-

tainly a conservative estimate, for it takes into account only the auriferous gravels which can probably be mined under the present conditions, or those that will prevail during the next few years, and does not make any allowance for the large unprospected areas.

A belt of schists lying north of the Yukon, extending from Chandalar Valley into the Koyukuk Valley, has been found to be auriferous. Mining has been going on in the latter district since 1899, with a production of probably over a million dollars in value. This field is one of very high cost in mining, and there are probably more extensive deposits with a smaller gold tenor than those now exploited. The Chandalar district has made but a small production, mining having been begun in 1906.

Placer gold has been found at several places in the lower Yukon basin, notably on the Melozitna, on Ruby Creek, and on the Innoko. Too little is known of the character or extent of these deposits to permit any statement as to their future importance. They prove, however, a wide distribution of the auriferous deposits and indicate possibilities in the way of future discoveries.

Nowhere in the Yukon basin has there been any lode mining, and systematic prospecting for auriferous veins has hardly been inaugurated. As a rule, the mineralization in the schists appears to be disseminated rather than concentrated, but there are exceptions to this rule. Some lode deposits have been found which, in a more accessible region, could probably be profitably exploited. The subject of the future of lode mining in this field does not admit of solution from the data in hand.

#### SEWARD PENINSULA.

Placer mining was begun on Seward Peninsula in 1897, but it was not until 1899 that the annual gold production exceeded \$100,000 in value. The total output of gold up to the close of 1907 was over \$44,000,000 in value. Practically all of this gold was taken from the placers, for only one small lode mine has made any considerable production, though a few tons of ore have been taken from several others.

The auriferous deposits of the peninsula can be roughly outlined as occurring in two general belts. One, about 40 miles wide, stretches a little north of east and skirts the southern shore line of the peninsula, embracing the gold placers of Nome, Solomon, and Council. This belt has been traced about 120 miles. The second belt stretches from the neighborhood of Port Clarence to Kotzebue Sound, a distance of about 140 miles, with a width of about 40 miles. In this belt are included the auriferous gravels of Teller, Kougarok, Inmachuk, and Kiwalik. As outlined, these belts embrace an area of about 10,000 square miles. In addition to these areas, evidence of mineralization has been found in the extreme western part of the peninsula, which includes the cassiterite, galena, and other ores of the York region.

In describing the geographic distribution of the mineral deposits the peninsula; it is not intended to imply that there is any great regularity in their occurrence. As a matter of fact, the distribution of the valuable minerals within these zones is very irregular. The placer gold seems to have been derived, for the most part, from contact zones between massive limestones and various types of schists. P. S. Smith's recent investigations show that other forms of auriferous deposits are those found in black siliceous slates and those in chloritic schists. Other types of mineral occurrence are those of cassiterite, galena, and other ores which are found in association with granitic intrusives near the western end of the peninsula and which have recently been described by Adolph Knopf.

While the types of mineral occurrence might be multiplied, for they include copper, antimony, tungsten, and other ores, what has been stated is sufficient to show that there is great variety in the form of mineralization. It also indicates that, in spite of the fact that there is now but little lode mining there is sufficient ground to believe that such an industry may be developed as to make it necessary to take it into account in estimating the gold reserves.

Though the Seward Peninsula auriferous gravels have been far more prospected than those of the Yukon-Tanana region, yet quantitative data of their gold contents are exceedingly scant. These data, however, were carefully compiled some years ago, and deductions made from them regarding the placer-gold reserves.\* Estimates were made by two different methods. By one the gold contents of auriferous gravels was valued at \$265,000,000; by the other, \$325,000,000. It can not be too often repeated that such computations are no more than mere approximations, for they are based on certain assumptions as to the gold tenor of the gravels, etc., which do not now admit of proof. These reserves appear to be two or three times as large as those estimated for the Yukon-Tanana region. This is due to the fact that in Seward Peninsula the data seemed to justify an attempt at an estimate of gold tenor for the entire body of auriferous gravels, while in the Yukon-Tanana region the information at hand only warranted an estimate of the auriferous gravels of the productive areas.

#### STATISTICS.

The systematic collection of statistics of gold production for Alaska was begun only in 1905, and the distribution of the output previous to that year is only an approximation. In the preparation of the following table the best available data have been used. In this table of production the Pacific coastal belt includes southeastern Alaska, the St. Elias region, and the Alaska Peninsula and adjacent islands, while under Copper River and Cook Inlet region are embraced the Kenai Peninsula and the Copper River and Susitna basins. The

\* Gold placers of Seward Peninsula; Bull. U. S. Geol. Survey No. 328, 1908; pp. 135-139.

Other geographical terms used in this table, such as

Peninsula, need no definition.

*Value of gold production of Alaska, with approximate distribution, 1880-1907.*

Year.	Pacific coastal belt.	Copper River and Cook Inlet region.	Yukon basin.	Seward Peninsula.	Total.
1880.....	\$20,000				\$20,000
1881.....	40,000				40,000
1882.....	150,000				150,000
1883.....	300,000		\$1,000		301,000
1884.....	200,000		1,000		201,000
1885.....	275,000		25,000		300,000
1886.....	416,000		30,000		446,000
1887.....	645,000		30,000		675,000
1888.....	815,000		35,000		850,000
1889.....	860,000		40,000		900,000
1890.....	712,000		50,000		762,000
1891.....	800,000		100,000		900,000
1892.....	970,000		110,000		1,080,000
1893.....	833,000		200,000		1,038,000
1894.....	882,000		400,000		1,282,000
1895.....	1,569,500	\$50,000	709,000		2,328,500
1896.....	1,941,000	120,000	800,000		2,861,000
1897.....	1,799,500	175,000	450,000	\$15,000	2,439,500
1898.....	1,802,000	150,000	400,000	75,000	2,517,000
1899.....	2,152,000	150,000	500,000	2,800,000	5,602,000
1900.....	2,606,000	160,000	650,000	4,750,000	8,166,000
1901.....	2,072,000	180,000	550,000	4,130,700	6,932,700
1902.....	2,546,000	375,000	800,000	4,561,800	8,283,400
1903.....	2,843,000	375,000	1,000,000	4,465,600	8,683,600
1904.....	3,135,800	500,000	1,300,000	4,164,600	9,100,000
1905.....	3,430,000	500,000	6,900,000	4,800,000	15,630,000
1906.....	3,454,794	332,000	10,750,000	7,500,000	22,036,794
1907.....	2,891,743	275,000	9,183,000	7,000,000	19,349,743
Total.....	40,311,937	3,342,000	34,964,000	44,262,700	122,935,227

Of the total about \$37,000,000 must be credited to lode production, which is nearly all included in the Pacific coastal belt of the above table. Up to the close of 1907 there was only one productive auriferous lode mine in Seward Peninsula, and none either in the Yukon basin or in the Copper River and Cook Inlet region. The auriferous lode production, with the exception of that of the Apollo mine on Unga Island, southwestern Alaska, and a few small mines of the same general region, together with a small gold output from the copper deposits of Prince William Sound and from the auriferous lodes of Seward Peninsula, is all from southeastern Alaska. As the Treadwell group of mines has an output valued at \$30,402,236, it will be seen that nearly five-sixths of the auriferous lode production is from this one ore body.

Accurate data regarding the source of the gold have been available only since 1906. They are summarized in the following table:

*Source of gold in Alaska, 1906-1907, in values.*

Kind of ore.	1906.	1907.
Placers.....	\$18,607,000	\$16,491,000
Siliceous ores.....	3,348,943	2,764,885
Copper ores.....	80,851	93,858



portance have been opened up, but the outlook for such in some localities appears hopeful.

On Prince of Wales Island, according to C. W. Wright, the copper ores, which are sulphides, occur along the contact of intrusives and limestones. U. S. Grant's description of the copper ores of Prince William Sound shows these to be sulphide ores which occur as lenses along shear zones. These shear zones are in greenstones or in contact zones between greenstones and graywackes. The Chitina belt, according to F. H. Moffit, includes both native and sulphide copper deposits. These occur at or close to a contact between a heavy greenstone (altered lava) and a limestone. This contact, along which mineralization seems fairly persistent though ore bodies of proved value have been exposed at only a few localities, has been traced for upward of a hundred miles.

The Nabesna-White River copper belt is of a similar character to that of the Chitina Valley, though here the value of the ore bodies found remains to be proved by further development work. In the Iliamna Lake region copper ores are said to be similar in occurrence to those of southeastern Alaska. Little is known of the other copper bearing localities of the Territory.

#### STATISTICS.

Copper mining was first attempted on Prince of Wales Island in 1880, but the project was soon abandoned. The industry was begun again in 1900 in Prince William Sound, and five years later the Prince of Wales Island deposits also began producing. The total output of copper from Alaska up to the close of 1907 was 20,843,352 pounds, of which 12,368,975 pounds came from the Prince of Wales Island mines and the balance from Prince William Sound.

#### SUMMARY.

It is impossible to make any estimate of the tonnage of copper-ore reserves of the Territory. The developed ore bodies have been computed in a few mines by the operators, but even if these figures were available they would have little bearing on the problem of the ultimate reserves. Less than a score of copper mines have been opened up in Alaska, and all but one of these are located in two districts. In one promising district there has been only a little surface prospecting and this also holds true of the several widely distributed copper deposits which are not included in the four best-known districts. Even in the largest mines the workings in few cases extend to a depth of more than one or two hundred feet. It is evident therefore, that the ore blocked out in the mines, whose copper content is probably less than 200,000,000 pounds of metal, has little bearing on the question of ultimate reserves, for it would not take

into account either the undeveloped ore bodies already found or the possibilities of discoveries in the little-prospected fields. Moreover, any estimate of tonnage could include only the ores which can be mined at the present price of copper, while an increase of this price would make available lower-grade ores which can not now be commercially exploited. The problem is furthermore complicated by the irregularity of many of the copper deposits.

There can be no doubt that the output of copper from the Territory will increase during the next few years. The accessibility and cheapness of exploitation of the ores of the Pacific coast province invite copper-mining enterprises, in spite of the irregularity of occurrence of most of these deposits. A railway is now under construction up the Copper River valley which will not only lead to early shipments of a large amount of copper ores from the deposits already found, but will also stimulate further search and probably lead to the discovery of other ore bodies.

## WATER RESOURCES.

### INTRODUCTION.

The principal value of the water resources of Alaska is for generating power to be used for mining, now the only extensive industry. There are two general methods of utilizing the water power: (1) By converting it into electricity or other form of energy, for the purposes of lode and placer mining. By such means the power can be transmitted to the locality of use. This form of utilization is now almost entirely confined to the Pacific coastal belt of the Territory. (2) The more direct use of the water under head for sluicing, elevating, and hydraulicking the auriferous alluvium. This second form of utilization has been extensively practiced in small plants throughout the placer districts.

Many of the gold placers and lode deposits can be profitably exploited only by the utilization of water power. The water powers are also valuable to other industries, but up to the present time have not been so utilized, except in a small way for running electric-light plants, machine shops in some of the coastal towns, and some fish-product manufactories.

An adequate knowledge of the distribution, volume, and gradients of the surface water is, therefore, of first importance to the industry of the Territory. The underground waters of Alaska need not here be considered; none such have been developed and little is known about their occurrence. There is a possibility that in some of the placer districts there may be underground waters in sufficient quantity to justify their development for purposes of supplementing the inadequate surface waters. Artesian waters have in a few instances been found underneath the layer of perpetually frozen ground. These

appear to be exceptional conditions, as usually the frost extends all the way to bed rock. Such ground waters, where they have been found, are probably very local in extent. There are also some potable waters derived from springs, but these, as well as the surface water used for towns, need not here be considered.

Facts regarding the water supply are scant and based almost entirely on the results of the investigations of the United States Geological Survey. These results are of two kinds—(1) the records of stream gaging, which furnish information as to the volumes of the watercourses, and (2) the topographic maps, which show the distribution of the water, as well as the gradients of the streams in which it flows. Measurements of stream flow have been carried on for three seasons (1906–1908) in some of the important placer districts of Seward Peninsula, for two seasons (1907–1908) in the Fairbanks district, and for one season (1908) in the Hot Springs, Rampart, and Birch Creek districts. These measurements furnish the only data on stream volume throughout the Territory, though a few corporations have obtained records from small areas preparatory to the installation of hydraulic plants.

The topographic data are more complete, for reconnaissance maps (scale 1:250,000, with 200-foot contours) of some 121,252 square miles have been made, which cover most of the important mining districts and about 20 per cent of the entire area of Alaska. These reconnaissance maps furnish a general conception of drainage basins and stream gradients. In addition, 2,732 square miles have been mapped in detail (scale 1:62,500, with 25, 50, or 100 foot contours), yielding accurate information of the extent of drainage basins and of stream gradients.

Only two of the larger geographic provinces of Alaska will here be considered, namely, (1) the Pacific coastal region and (2) the central region, for, as far as can now be foreseen, it is only in these two that the water has any industrial value. These two provinces differ essentially in climate and relief and, indeed, present almost the extreme conditions as regards the occurrence and utilization of surface waters. In the coastal belt as a whole the topography is extremely rugged and many of the streams are fed by perennial snows, which, together with the large precipitation (75 to 120 inches), yield a large run-off with no great fluctuations during the summer months.

Beyond the coastal barrier the climate is semiarid (precipitation 10 to 20 inches), the relief is weak, and hence stream gradients are low, while there is no permanent snow. Another feature of the precipitation is that summer rainfall is very local. Moreover, the general frozen condition of the subsoil to bed rock probably prevents any considerable ground storage. These conditions make for a small

run-off per square mile and very marked fluctuations in stream volumes. Moreover, the low relief makes it difficult to utilize the water under head.

Seward Peninsula, though not strictly a part of the central region, possesses the same general hydrographic conditions. The precipitation (10 to 30 inches), however, averages a little greater than in the Yukon basin. Here also the low stream gradients make much of the run-off unavailable for placer mining.

The conditions affecting surface waters in the area drained by Susitna and Copper rivers differ somewhat from those existing in the Pacific coastal region and in the inland province. In part this area has as strong relief as that along the seaboard, yet its precipitation is far less. On the whole, however, this region is better supplied with water than the Yukon basin.

#### PACIFIC COAST REGION.

In southeastern Alaska alone has there been any considerable utilization of water power. The Census Bureau collected the statistics of the developed water power in this part of the territory. Through the courtesy of the Director of the Census the following data are available. The statistics show that a total maximum of 15,699 horsepower has been developed and that 100 water wheels have been installed. Of this maximum 2,816 horsepower is available during low-water season. It is reported that at the localities where this power has been developed there is 14,135 horsepower available. Of the developed horsepower 3,403 horsepower is utilized by electric-light plants, canneries, and some other small industrial enterprises, and the rest by mining and smelting plants. The Treadwell group of mines alone utilizes some 6,647 horsepower. In addition to the above a few hundred horsepower is developed in other parts of the Pacific coast belt.

Southeastern Alaska affords conditions which are peculiarly favorable for the development of water power. The glaciation of this region has developed a topography which, with its cirques and many lakes lying at considerable altitude above sea level, is favorable to water storage. While the run-off during the summer months is much larger than during the winter, yet there are many localities where a large amount of power can be developed, even during the low-water stages.

#### YUKON BASIN.

There are no records which make it possible to state the quantity of water used for placer mining in the various Yukon districts, but it is known to be a large amount. Nor has stream gaging progressed far enough to determine the available water. However, it

is probably safe to say that within a few years every supply so situated as to be directly applicable to placer mining will be utilized. Even when this has been brought about, the supply will be inadequate for the gold placers already opened up. In addition to this water directly applicable to placer mining, there are a number of water powers which can be utilized for certain mining operations by transformation to other forms of energy. It is probable that even after the development of these water powers the demands of future mining interests will not have been met. The utilization of coal to supply this demand is discussed elsewhere in this report. Mention should be made in this connection of the possibility of developing power along the streams which find their source in the high mountains stretching along the southern margin of the Yukon basin. These streams have not been measured and but few have been surveyed. They are known, however, to have a much larger volume than those of the central region proper, and the topography would appear to be favorable to water-power development. Some of the important placer districts lie within 50 or 100 miles of the mountain front.

The following table, which is based on the investigation of Mr. Covert, presents in summary form the available data regarding the run-off in the districts which have been investigated. It can not be too strongly emphasized that, as this is based on only one or two seasons' observations, the data presented are only an approximation.

*Estimates of mean annual discharge and run-off of drainage basins in Yukon-Tanana region, Alaska.*

[By C. C. Covert.]

District.	Year	Second-foot per square mile.	Depth in inches.	Per cent estimated.	Duration of record.	
					From	To
Fairbanks, 826 square miles	1907	0.790	10.00	62	June 26	Oct. 17
	1908	.710	9.06	54	May 1	Oct. 21
Mean		.745	10.13	58		
Hot Springs, 56 square miles	1908	.44	6.00	95	June 16	Sept. 8
Rampart, 212 square miles	1908	.54	7.40	90	do	do.
Circle, 2,130 square miles	1908	.90	13.50	91	June 26	Oct. 11

\* The run-off for the period not covered by records was estimated at approximately 0.25 second-foot per square mile.

#### SEWARD PENINSULA.

What has been said of the Yukon basin applies also to Seward Peninsula. Here, too, nearly all the water available for direct application to placer mining will soon be utilized, and even then can not meet the demand. Some important undeveloped water powers are known to exist in this province.

The topography of Seward Peninsula, like that of the Yukon basin, is of low relief, and therefore a comparatively small part of

the run-off can be made available for mining. In the mountain mass, including the Bendeleben and Kiglwaik ranges, the conditions for water storage are somewhat more favorable than in other parts of the peninsula. Here there are some glacial cirques, and though these are of comparatively small extent, they have an influence in the conservation of water and snow. What is of still greater importance, however, is the greater rainfall which occurs in these high mountains compared with other parts of the peninsula.

Mr. Henshaw has summarized his three seasons' observations on stream flow in Seward Peninsula in the table which follows. The value of the data contained in this table will be increased by considering the character of the topography of the basins whose run-off is given. Kruzgamepa River, at Salmon Lake, drains a basin typical of the Kiglwaik and Bendeleben mountain areas. Kuzitrin River and Imuruk Lake lie in the northern portion of the peninsula and represent the area north of the mountains. There are not sufficient data to make any estimate of the yearly run-off from the country south of the mountains.

*Estimates of mean annual discharge and run-off of drainage basins in Seward Peninsula, Alaska.*

[By F. F. Henshaw.]

Stream.	Year.	Second-feet per square mile.	Depth in inches.	Per cent estimated.	Duration of record.	
					From—	To—
Kruzgamepa at Salmon Lake, 81 square miles.	1906.	3.68	50.2	38	May 28, 1906	Sept. 30, 1906
	1907.	3.77	51.1	40	June 15, 1907	Oct. 5, 1907
	1908.	2.40	32.6	63	June 21, 1908	Sept. 30, 1908
	Mean	3.28	44.6	47		
Kuzitrin at Lanes Landing, 1,720 square miles	1907.	.46	6.2	100		
	1908.	.39	5.3	40	June 1, 1908	Sept. 30, 1908
	Mean	.42	5.7			
	1906-1907.	.59	7.9		Aug. 16, 1906	Aug. —, 1907
Imuruk Lake, 99 square miles.	1907-1908.	.50	6.8		Oct. —, 1907	Sept. 25, 1908
	Mean	.54	7.4			

The discharge of Kruzgamepa River at Salmon Lake has been assumed to decrease regularly from October 1 to a minimum of 30 second-feet on April 20, then to increase slowly until the break-up of the ice, and more rapidly until the date of the beginning of records, which has been taken as the maximum for the year. The run-off from snow for 1908 was taken as 70 per cent of the mean of that for the two previous years.

The run-off of Kuzitrin River for May, 1908, was taken as 75 per cent of that for June, and for the remainder of the year as 0.06 second-feet per square mile. The run-off for 1907 was estimated by comparison with the two years' record at Imuruk Lake. The flow into Imuruk Lake was determined by closing the dam at the outlet and noting the rise of the water surface.



# INDEX.

A.	Page.		Page.
Acknowledgments to those aiding.....	33, 70, 172	Annoma, recovery of.....	62-63, 66
Adirondack ores, character of.....	81-84	waste of.....	15-17
geology of.....	80-81	Anthracite coal fields, area of.....	7
occurrence and character of.....	72	production of.....	13
Agricultural land, minerals in, title to.....	115-116	waste in.....	12-13
Alabama, coal of, supply and exhaustion of.....	17	<i>See also</i> Coal.	
estimate of.....	89, 90, 91, 95, 102-103	Anthracite Coal Waste Commission, report	
iron ore of.....	88-89, 90-91, 92	of.....	12-13
natural gas of.....	51	Appalachian ores, estimate of.....	91
Alaska, coal imports of.....	184	occurrence and character of.....	71, 90-95
coal of.....	174-189	Appalachians, petroleum of.....	30
composition of.....	175	petroleum.....	34-35
consumption of.....	183-184	Arizona, coal of, supply and exhaustion of.....	17
distribution of.....	175-181	copper of.....	133, 136-139
map showing.....	172	iron ore of, estimate of.....	102-103
geology of.....	174-175	gold of, production of.....	121
mining of, waste in.....	187	silver of, production of.....	130
production.....	183-184	zinc of.....	154
reserves of.....	181-184	Arkansas, coal of, supply and exhaustion of.....	17-18
utilization of.....	185-188	iron ores of.....	97-99
copper of.....	133, 135, 201-203	estimates of.....	99, 102-103
distribution of.....	201-202	phosphates of.....	163
map showing.....	172	Arseme, waste of.....	117-118
production of.....	202		
resources of.....	202-203	B.	
gold of.....	192-201	Bain, H. F., on zinc of Wisconsin.....	153
distribution of.....	193-198	Beehive ovens, waste due to.....	14-17
map showing.....	172	Bering River, Alaska, coal of.....	177
occurrence of, mode of.....	193	Bisbee district, Arizona, copper of.....	136, 137
production of.....	124, 198-200	Bituminous coal fields, area of.....	7
resources of.....	194-198, 200	waste in.....	13-14
source of.....	199-200	Bolders, use of gas under, waste in.....	59-60
iron of.....	191	Briquets, peat, utilization of.....	64
lead of.....	201	Brooks, A. H., on mineral resources of	
mineral resources of.....	172-207	Alaska.....	172-207
distribution of.....	173-174	Brooks, A. H., and Martin, G. C., on coal of	
map showing.....	172	Alaska.....	174-189
peat of.....	188-189	Brown iron ore, definition of.....	70
petroleum of.....	189-190	estimate of.....	103
petroleum imports of.....	184	production of.....	111
silver of.....	201	<i>See also</i> Iron ores.	
subdivisions of.....	173-174	By-product coke ovens, economy of.....	15-17
water resources of.....	203-207		
zinc of.....	201	C.	
Alaska, northern, coal of.....	180-181	California, coal of, supply and exhaustion of.....	18
Alaska, southeastern, coal of.....	177	iron ores of.....	101
Alaska, southern, gold of.....	194	estimate of.....	102-103
gold of, production of.....	194-195	natural gas of.....	51
Alaska Peninsula region, coal of.....	179	copper of.....	133, 140-141
gold of.....	196	gold of, production of.....	122-123
Alaska Range, gold of.....	195	petroleum of.....	32
Alcohol, manufacture of, from peat.....	67	quality of.....	32
use of.....	49	yield of.....	35
		silver of, production of.....	130



	Page.		Page.
Campbell, M. R., and Parker, E. W., on coal fields of the United States.....	7-26	Cornwall ores, occurrence and character of.....	71, 100-101
Canada, iron ores of.....	104, 105, 106	Cuba, iron ores of.....	104-105, 106
Carbonate iron ore, definition of.....	70	Culin, gas from.....	61
estimate of.....	103	waste in.....	1
production of.....	111		
See also Iron ores.		D.	
Caving, waste due to.....	11	Davis, C. A., on peat resources.....	62-63
Chitina region, Alaska, copper of.....	202	Day, D. T., on natural-gas resources.....	51-61
Clinton ores, availability of.....	74-75	on petroleum resources.....	30-33
character of.....	84-85		
distribution of.....	86-89	E.	
estimates of.....	86-90, 103	Fertilizer filler, use of peat for.....	67
geology of.....	85	Florida, peat utilization in.....	63
tenor of.....	74-75, 86	phosphates of.....	120-122
See also Iron ores.		exhaustion of.....	165, 169
Coal, mining of, beginnings of.....	8-9	production of.....	158, 160, 161
mining of, waste in.....	9	Forest lands, minerals in, title to.....	136
sources of.....	11-17	Fuel, peat for.....	64-66
preparation of, improvements in.....	12	Fuel oils, waste in.....	48, 49
waste in.....	12		
production of.....	9, 27-29	G.	
chart showing.....	26	Gannett, Henry, coal estimate by.....	10
increase in.....	10-11, 27, 29	on future coal production.....	27-29
supply of.....	8, 10, 13, 27	Gas, coal, waste of.....	15-17
duration of.....	10-11	Gas, natural. See Natural gas.	
transportation of.....	16	Gas, producer, manufacture of, from peat.....	62-64
See also Alaska, coal of.		See also Peat.	
Coal fields, area of.....	7	Gas engine, economy of.....	76-78
distribution of.....	17-20	Gas wells, capping of.....	66-67
map showing.....	6	waste from.....	7, 78
report on.....	7-30	See also Natural gas.	
source of.....	5	Geological Survey, work of.....	17, 8
Coeur d'Alene district, Idaho, lead of.....	146-147	Georgia, coal, supply and exhaustion of.....	18, 19
Coke, by-products of, demand for.....	17	iron ores of.....	88, 89, 90, 93
by-products of, waste of.....	15-17	estimate of.....	89, 91, 93, 94
Coke making, waste in.....	14, 17	Idaho, district of, Arizona, copper of.....	139, 147, 148
Cold Bay, Alaska, petroleum of.....	190	Gold, consumption of.....	128, 129
Colorado, coal of, supply and exhaustion of.....	18	production of.....	129, 132, 137
copper of.....	133, 134	chart showing.....	129, 132
gold of, production of.....	124-125	Gold-bearing gravels. See Clastic rocks.	
iron of.....	101-102	Gold ores, character and distribution of.....	134
estimate of.....	102-103	extent of.....	134
lead of.....	145, 146	mining of, waste in.....	137
natural gas of.....	51	resources of.....	137, 137
petroleum of.....	32	duration of.....	137
silver of, production.....	130	silver from.....	130
zinc of.....	153-154	smelting of, waste in.....	117, 119
Conservation report, extracts from.....	5	See also Metallic ores, Alaska, gold of.	
Cook Inlet, Alaska, coal of.....	177-178	Gossan, occurrence of.....	12
petroleum of.....	190	Grant U. S., on Prince of Wales Island.....	101, 92
Copper, consumption of.....	143	Gulf field, petroleum of.....	32
production of.....	131-133	yield of.....	33
chart showing.....	130		
Copper ores, character and distribution of.....	114	H.	
extent of.....	114	Hayes, C. W., on iron ores of the United States.....	70-71
gold from.....	124-125	Hematite, definition of.....	16
mining of, waste in.....	116, 143	estimate of.....	16
resources of.....	133-143	occurrence and character of....., passim	76-101
duration of.....	142-143	production of.....	11
silver from.....	130	See also Iron ores.	
smelting of, waste in.....	117, 143-144, 185	Hess, F. J., on arsenic waste.....	117, 1
See also Alaska, copper of; Metallic ores.		Hospital dressings, use of peat for.....	67
Copper River basin, Alaska, copper of.....	201-202		
gold of.....	195-196		

	Page.
<b>Idaho, coal of, supply and exhaustion of</b> .....	19
<b>copper of</b> .....	133, 134
<b>gold of, production of</b> .....	121
<b>iron ores of, estimate of</b> .....	102-103
<b>lead of</b> .....	145, 146-147
duration of.....	147
<b>phosphates of</b> .....	163-164
duration of.....	166-167
<b>silver of, production of</b> .....	130
<b>zinc of</b> .....	154
<b>Illinois, coal of, supply and exhaustion of</b> ....	19
natural gas in.....	51
<b>petroleum of</b> .....	31, 33-34
yield of.....	31, 35
<b>Indiana, coal of, supply and exhaustion of</b> ....	19
natural gas in.....	51
conservation of.....	60
<b>petroleum of</b> .....	31
yield of.....	35
<b>Iowa, coal of, supply and exhaustion of</b> .....	19-20
<b>iron ores of, estimate of</b> .....	102-103
<b>Iron, pig, production of, chart showing</b> .....	110
<b>Iron ores, availability of</b> .....	73-76, 79
chemical classification of.....	70-71
deposits of, character of.....	71-72
distribution of.....	76-102
exports of.....	105-106
foreign supplies of.....	103-106
imports of.....	105-106
impurities in.....	75
mining of, conditions of.....	74, 109
history of.....	108-109
waste in.....	107
origin of.....	71-72
production of.....	108-113
chart showing.....	110
reduction of, waste in.....	107-108
resources of, duration of.....	112-113
estimates of.....	72-76, 79
tenor of.....	74-75, 78-80
transportation of.....	75
waste of.....	107-108
<i>See also</i> Alaska, iron of.	
<b>Iron Springs ores, occurrence and character of</b> .....	101
<b>J.</b>	
<b>Jerome district, Arizona, copper of</b> .....	136, 138
<b>K.</b>	
<b>Kansas, coal of, supply and exhaustion of</b> ....	20
natural gas in.....	51
<b>petroleum of</b> .....	31
<b>zinc of</b> .....	152
<b>Katalla, Alaska, petroleum at</b> .....	190
<b>Kenai Peninsula, Alaska, gold of</b> .....	195
<b>Kentucky, coal of, supply and exhaustion of</b> ..	20
<b>iron ore of</b> .....	87, 94-95, 96
estimate of.....	87, 90, 95, 96, 102-103
natural gas in.....	51
<b>petroleum of</b> .....	30
<b>Kodiak Island, Alaska, gold of</b> .....	195

	Page.
<b>L.</b>	
<b>Lake Superior iron ores, character of</b> .....	78-98
estimated amount of.....	79-80
geology of.....	76-78
production of.....	76-77, 111
tenor of.....	78-79
<b>Lamp oils, advantages of</b> .....	47
<b>Lead, consumption of</b> .....	149
production of.....	114-115, 148
chart showing.....	144
recovery of.....	149
substitutes for.....	149
waste of.....	149-150
<b>Lead ores, character and distribution of</b> .....	114
extent of.....	114
resources of.....	145-149
duration of.....	145, 149
silver from.....	130
smelting of, waste in.....	117, 150
tariff on.....	150
waste of.....	150
<i>See also</i> Metallic ores; Alaska.	
<b>Lead paint, waste in use of</b> .....	149
<b>Landgren, Waldemar, on gold, silver, copper, lead, and zinc resources</b> .....	114-156
<b>Louisiana, natural gas in</b> .....	51
<b>petroleum of</b> .....	31, 32
quality of.....	32
yield of.....	35
<b>Low-grade material, abandonment of, waste due to</b> .....	11-12, 107, 115-116, 156, 169
<b>Lubricating oils, exhaustion of</b> .....	47-48
<b>M.</b>	
<b>Magnetite, definition of</b> .....	70
estimate of.....	102
occurrence and character of.....	passim 78-102
production of.....	111
<b>Martin, G. C., on petroleum of Alaska</b> .....	189-190
<b>Martin, G. C., and Brooks, A. H., on coal of Alaska</b> .....	174-189
<b>Maryland, coal of, supply and exhaustion of</b> ..	20-21
<b>iron ores of, estimate of</b> .....	94, 102-103
<b>Matanuska region, Alaska, coal of</b> .....	178
<b>Metallic ores, distribution of</b> .....	114
duration of.....	118-119
mining of, waste in.....	116
reduction of, waste in.....	116
resources of, estimate of.....	118
<i>See also</i> particular ores; Alaska.	
<b>Mexico, iron ores of</b> .....	104
<b>Michigan, coal of, supply and exhaustion of</b> ..	21
<b>copper of</b> .....	133, 135-136
<b>iron ores of</b> .....	77, 80
estimates of.....	80, 102-103
natural gas of.....	51
<b>Mid-Continent field, petroleum of</b> .....	31, 35
<b>Mineral claims, title to</b> .....	115
<b>Mineral lands, distribution and ownership of</b> .....	114-115
valuation of.....	115-116
<b>Mineral rights, reservation of</b> .....	116
<b>Minnesota, iron ores of</b> .....	77, 80
<b>iron ores of, estimates of</b> .....	80, 102-103

	Page.
Missouri, coal of, supply and exhaustion of . . .	21
iron ores of . . . . .	97-99
estimate of . . . . .	99, 102-103
lead of . . . . .	145-146
duration of . . . . .	146
natural gas in . . . . .	51
silver of . . . . .	152
duration of . . . . .	152
waste of . . . . .	117
Montana, arsenic in, waste of . . . . .	117-118
coal of, supply and exhaustion of . . . . .	21-22
copper of . . . . .	133, 139
iron ores of, estimate of . . . . .	102-103
gold of, production of . . . . .	122
natural gas in . . . . .	51
silver of, production of . . . . .	130
Morenci district, Arizona, copper of . . . . .	136, 137

## 4.

National Conservation Commission report,  
extracts from

Natural gas, areas of	54
compression of	64
conservation of	60-61
consumption of, waste in	59-60
distribution of	54
handling of, difficulties in	58
market for	59
pressure of	51-52
decline in	57
production of	52-57
resources of	51-61
return of, to ground	64
substitutes of	
supply of, duration of	
transportation of	
waste of	
prevention of	

Natural gas fields, description of distribution of, map showing	
Nevada, copper of	144-146
gold of, production of	124-125
iron ores of, . . .	161
estimates of	161-162, 165
silver of, production of	146
zinc of	154

New England, iron ores of, estimate of	94 192 145
Newfoundland, iron ores of	184 105, 106

New Jersey, iron ores of.	90
iron ores of, estimate of	91, 94 102 103
zinc of.	153
duration of	153

New Mexico, coal of, supply and exhaustion of.....	22
copper of.....	143, 144
iron ores of.....	102
estimate of.....	102, 103

New York, iron ores of . . . . .	83 84, 87, 90
iron ores of, estimate of . . . . .	84, 87, 90, 91, 94, 102 103
tenor of . . . . .	81, 81

natural gas in.....	51
petroleum of, decrease in, chart showing	44
North Carolina, coal of, supply and exhaustion of.....	22
iron ores of.....	90
estimate of.....	91, 102-103

	Page.
North Dakota, coal of, supply and exhaustion of.....	22

 $\Omega$ 

Ohio, coal of, supply and exhaustion of.....	22-23
iron ores of.....	94-95
estimates of.....	95, 102-103

natural gas in .....	51
conservation of .....	60,61
petroleum of .....	30,31
yield of .....	35

Oklahoma, coal of, supply and exhaustion of.	23
natural gas in . . . . .	51
petroleum of . . . . .	31-32
waste of . . . . .	31-32
zinc of. . . . .	153

Oregon, coal of, supply and exhaustion of . . .	23
gold of, production of . . . . .	121
iron ore of, estimate . . . . .	102-103

Oriskany ores, occurrence and character of . . . 71-72, 93

49

Pacific coast, cost of, conservation of.....	185
Iron ores of, estimate of .....	102 103
production of .....	111

Parker, F. W., and Campbell, M. K., on coal  
fields of the United States 7, 29

Printing material, use of post for	67 48
Paper manufacture of, from post	67

Post available amount of	(5, 6, 18, 19)
distribution of	(8, 15, 16, 19)

drying of	6.4 (6.4)
fuel from	6.4 (6.5)

as predicted from	$0.4 \pm 0.1$
products of	$0.1 \pm 0.1$

1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159	2160	2161	2162	2163	2164	2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191	2192	2193	2194	2195	2196	2197	2198	2199	2200	2201	2202	2203	2204	2205	2206	2207	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223	2224	2225	2226	2227	2228	2229	2230	2231	2232	2233	2234	2235	2236	2237	2238	2239	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255	2256	2257	2258	2259	2260	2261	2262	2263	2264	2265	2266	2267	2268	2269	2270	2271	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287	2288	2289	2290	2291	2292	2293	2294	2295	2296	2297	2298	2299	2300	2301	2302	2303	2304	2305	2306	2307	2308	2309	2310	2311	2312	2313	2314	2315	2316	2317	2318	2319	2320	2321	2322	2323	2324	2325	2326	2327	2328	2329	2330	2331	2332	2333	2334	2335	2336	2337	2338	2339	2340	2341	2342	2343	2344	2345	2346	2347	2348	2349	2350	2351	2352	2353	2354	2355	2356	2357	2358	2359	2360	2361	2362	2363	2364	2365	2366	2367	2368	2369	2370	2371	2372	2373	2374	2375	2376	2377	2378	2379	2380	2381	2382	2383	2384	2385	2386	2387	2388	2389	2390	2391	2392	2393	2394	2395	2396	2397	2398	2399	2400	2401	2402	2403	2404	2405	2406	2407	2408	2409	2410	2411	2412	2413	2414	2415	2416	2417	2418	2419	2420	2421	2422	2423	2424	2425	2426	2427	2428	2429	2430	2431	2432	2433	2434	2435	2436	2437	2438	2439	2440	2441	2442	2443	2444	2445	2446	2447	2448	2449	2450	2451	2452	2453	2454	2455	2456	2457	2458	2459	2460	2461	2462	2463	2464	2465	2466	2467	2468	2469	2470	2471	2472	2473	2474	2475	2476	2477	2478	2479	2480	2481	2482	2483	2484	2485	2486	2487	2488	2489	2490	2491	2492	2493	2494	2495	2496	2497	2498	2499	2500	2501	2502	2503	2504	2505	2506	2507	2508	2509	2510	2511	2512	2513	2514	2515	2516	2517	2518	2519	2520	2521	2522	2523	2524	2525	2526	2527	2528	2529	2530	2531	2532	2533	2534	2535	2536	2537	2538	2539	2540	2541	2542	2543	2544	2545	2546	2547	2548	2549	2550	2551	2552	2553	2554	2555	2556	2557	2558	2559	2560	2561	2562	2563	2564	2565	2566	2567	2568	2569	2570	2571	2572	2573	2574	2575	2576	2577	2578	2579	2580	2581	2582	2583	2584	2585	2586	2587	2588	2589	2590	2591	2592	2593	2594	2595	2596	2597	2598	2599	2600	2601	2602	2603	2604	2605	2606	2607	2608	2609	2610	2611	2612	2613	2614	2615	2616	2617	2618	2619	2620	2621	2622	2623	2624	2625	2626	2627	2628	2629	2630	2631	2632	2633	2634	2635	2636	2637	2638	2639	2640	2641	2642	2643	2644	2645	2646	2647	2648	2649	2650	2651	2652	2653	2654	2655	2656	2657	2658	2659	2660	2661	2662	2663	2664	2665	2666	2667	2668	2669	2670	2671	2672	2673	2674	2675	2676	2677	2678	2679	2680	2681	2682	2683	2684	2685	2686	2687	2688	2689	2690	2691	2692	2693	2694	2695	2696	2697	2698	2699	2700	2701	2702	2703	2704	2705	2706	2707	2708	2709	2710	2711	2712	2713	2714	2715	2716	2717	2718	2719	2720	2721	2722	2723	2724	2725	2726	2727	2728	2729	2730	2731	2732	2733	2734	2735	2736	2737	2738	2739	2740	2741	2742	2743	2744	2745	2746	2747	2748	2749	2750	2751	2752	2753	2754	2755	2756	2757	2758	2759	2760	2761	2762	2763	2764	2765	2766	2767	2768	2769	2770	2771	2772	2773	2774	2775	2776	2777	2778	2779	2780	2781	2782	2783	2784	2785	2786	2787	2788	2789	2790	2791	2792	2793	2794	2795	2796	2797	2798	2799	2800	2801	2802	2803	2804	2805	2806	2807	2808	2809	2810	2811	2812	2813	2814	2815	2816	2817	2818	2819	2820	2821	2822	2823	2824	2825	2826	2827	2828	2829	2830	2831	2832	2833	2834	2835	2836	2837	2838	2839	2840	2841	2842	2843	2844	2845	2846	2847	2848	2849	2850	2851	2852	2853	2854	2855	2856	2857	2858	2859	2860	2861	2862	2863	2864	2865	2866	2867	2868	2869	2870	2871	2872	2873	2874	2875	2876	2877	2878	2879	2880	2881	2882	2883	2884	2885	2886	2887	2888	2889	2890	2891	2892	2893	2894	2895	2896	2897	2898	2899	2900	2901	2902	2903	2904	2905	2906	2907	2908	2909	2910	2911	2912	2913	2914	2915	2916	2917	2918	2919	2920	2921	2922	2923	2924	2925	2926	2927	2928	2929	2930	2931	2932	2933	2934	2935	2936	2937	2938	2939	2940	2941	2942	2943	2944	2945	2946	2947	2948	2949	2950	2951	2952	2953	2954	2955	2956	2957	2958	2959	2960	2961	2962	2963	2964	2965	2966	2967	2968	2969	2970	2971	2972	2973	2974	2975	2976	2977	2978	2979	2980	2981	2982	2983	2984	2985	2986	2987	2988	2989	2990	2991	2992	2993	2994	2995	2996	2997	2998	2999	3000
------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------

12. 10. 1971

of	21-24
from one of	87, 88, 93, 94, 95, 101

existence of ... 88, 90, 95, 101, 102, 103  
 existed as in ... 51

$$f(x) = \frac{1}{2} \left( \frac{1}{x} + \frac{1}{x^2} \right) \quad (2)$$

the cause for a large shipment.

conservation of 18 79 18  
conservation of 10

*Illustrations of* \_\_\_\_\_ p. \_\_\_\_

Exports of

production of . . . . . 100

chart showing	.....	4
exhaustion of	.....	4
future of	.....	4

future of.....	47
history of.....	35
maps to.....	40

waste in. . . . .	40, 18
substitutes for. . . . .	34

supply of .....	39
duration of .....	44
cost of .....	47-48

use of, waste in.....	47-48
waste of.....	46-48
prevention of.....	48-49

• Petroleum, wells for.....	40-42	South Carolina, phosphates of.....	160-161
• wells for, average production of.....	43	phosphates of, exhaustion of.....	165, 169
crowding of, view of.....	32	production of.....	158, 161
life of.....	42-43	South Dakota, coal of, supply and exhaustion	
waste of gas from.....	58-59	of.....	24
See also Alaska, petroleum of.....		gold of, production of.....	121
Petroleum fields, description of.....	30-32	natural gas in.....	51
distribution of, map showing.....	30	Spelter, production of.....	150-151
Petroleum sands, porosity of.....	34	production of, plate showing.....	150
thickness of.....	33-34	Stable litter, use of peat for.....	66-67
Phosphate deposits, character and distribu-		Steel, production of, chart showing.....	110
tion of.....	159-164	Susitna basin, Alaska, gold of.....	195
fertilizers from.....	164		
foreign control of.....	170	T.....	
foreign supplies of.....	169	Tailings, storage of.....	116-117, 127, 144, 150
geology of.....	158	Tar, market for.....	17
mining of, history of.....	157-158	waste of.....	15-17
waste in.....	169	Tennessee, coal of, supply and exhaustion of.....	24
paper on.....	157-171	copper of.....	133, 135
production of.....	158	iron ores of.....	88-89, 91, 92, 96
resources of.....	157, 159-167	estimate of.....	89, 90, 94, 95, 96, 102-103
duration of.....	165-167, 168	petroleum of.....	30
Phosphates, export of.....	167-168, 170	phosphates of.....	161-162
substitutes for.....	169-170	exhaustion of.....	165-166, 169
Pillars, necessity for leaving, waste due to.....	11-12,	production of.....	158, 163
	107, 116, 155	Texas, coal of, supply and exhaustion of.....	24
Placer mines, estimation of.....	192, 200-201	iron ores of.....	96-97, 99-100
production from.....	122-123, 126	estimate of.....	97, 102-103
reserves of.....	123	natural gas in.....	51
title to.....	115	petroleum of.....	31, 32, 34
waste in.....	127-128	quality of.....	32
Prince of Wales Island, Alaska, copper of.....	202	yield of.....	34-35
iron of.....	191	Titaniferous ores, availability of.....	75
Prince William Sound, Alaska, copper of.....	201-202	estimate of.....	103
Public lands, petroleum in, conservation of.....	48	occurrence and character of.....	71, 82-83
R.....		U.....	
Richmond basin, Virginia, coal mining in.....	8-9	Utah, arsenic in, waste of.....	118
Road oiling, waste in.....	48	coal of, supply and exhaustion of.....	24-25
Rocky Mountain iron ores, occurrence and		copper of.....	133, 139-140
character of.....	99-100	iron ores of.....	101
production of.....	111	estimate of.....	101, 102-103
		lead of.....	147-148
S.....		duration of.....	148
St. Elias Range, Alaska, gold of.....	195	natural gas in.....	51
Seward Peninsula, Alaska, coal of.....	180	phosphates of.....	163-164
gold of.....	197-198	duration of.....	166-167
Siliceous iron ores, availability of.....	75	silver of, production of.....	130
Silver, consumption of.....	131	zinc of.....	154
exports of.....	131		
price of.....	129	V.....	
production of.....	129	Van Hise, C. R., on utilization of sewage....	169
plate showing.....	128	Van Horn, F. B., on phosphate deposits ..	157-171
Silver ores, character and distribution of....	114	Virginia, coal of, supply and exhaustion of....	25
extent of.....	114	iron ore of.....	88, 90-93
production from.....	130	estimate of.....	88, 90, 91, 94, 102-103
resources of.....	130-131		
duration of.....	130-131	W.....	
smelting of, waste in.....	117	Washington, coal of, supply and exhaustion	
See also Metallic ores; Alaska.....		of.....	25
Slack coal, waste in.....	14	iron ores of.....	101
Smelter fumes, damage by.....	118	estimate of.....	102-103
waste in.....	117-118	natural gas in.....	51
Smelting, losses in.....	117	Water power, conservation of, coal saving by.....	29
South Carolina, iron of, ores of.....	90	Wells, high-pressure gas, waste from.....	57-58
iron ores of, estimate of.....	91, 102-108		

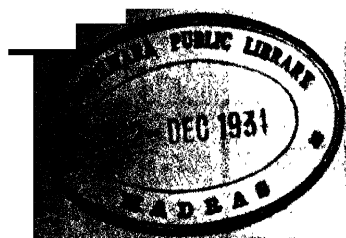
West Virginia, coal of, supply and exhaustion of.....	25
iron ore in.....	88, 93
estimate of.....	90, 94, 102-103
natural gas in.....	51
conservation of.....	60
petroleum of.....	30, 33
White, I. C., on natural-gas waste.....	59
White lead, wasteful use of.....	149
Wisconsin, iron ores of.....	77, 86-87
estimates of.....	80, 87, 90, 102-103
zinc of.....	153
Wood, manufacture of, from peat.....	67
substitution of peat for.....	65
Wright, C. W., on iron of Alaska.....	191
Wyoming, coal of, supply and exhaustion of.....	25-26
copper of.....	133-134
iron ores of.....	90-100
estimate of.....	102-103
natural gas in.....	51
petroleum of.....	32
phosphates of.....	163-164
duration of.....	166-167

Yakutat, Cape, Alaska, petroleum of.....	177
Yukon region, Alaska, coal of.....	278
gold of.....	184-185

## Z.

Zinc, consumption of.....	154-155
production of.....	150-151
plate showing.....	150
recovery of.....	152
Zinc ores, character and distribution of.....	111
extent of.....	111
mining of, waste in.....	153
resources of.....	152-154
duration of.....	154
silver from.....	130
smelting of, waste in.....	117, 155-156
tariff on.....	155
waste of.....	155-156
See also Metallic ores, Alaska	
Zinc paint, production of.....	150-151, 154
production of plate showing.....	150





REFERENCE

